June 1997
Volume 42, Number 6
ISSN 0020-1324-RECACP

50 Anniversary
1947-1997

RESPIRATORY CARE

A MONTHLY SCIENCE JOURNAL
41ST YEAR—ESTABLISHED 1956

AARC

43rd International Respiratory Congress
December 6-9 • New Orleans, Louisiana

■ Editorials

Avoiding the 'Tower of Babel' in RESPIRATORY CARE

The Manuscript Preparation Guide: Revisited and Revised

■ Ventilatory Management Protocol: A Study

■ Assessment Tool for the Management of Home Oxygen Concentrators

■ Points of View

Heating Gases Higher than Body Temperature in Cold Water Injuries

■ Guidelines, Recommendations, & Statements

Uniform Requirements for Manuscripts

Declaration of Helsinki

Standard Abbreviations & Symbols

Revised Manuscript Preparation Guide

Jazz It Up
In New Orleans!
American Association for Respiratory Care
43rd International Respiratory Congress
December 6-9, 1997, in New Orleans, LA
OPEN FORUM
Workshops
Continuing Education
Exhibit Hall
Training Sessions
The latest in technology, clinical advancements, governmental issues, and health care reform – all geared specifically for the respiratory care practitioner
AARC
50 Anniversary
1947-1997

It's easy to see why TheraPEP® is becoming the PEP therapy device of choice.

Easy to use.

COPD patients can master Positive Expiratory Pressure therapy quickly, and maintain an effective continuum of care away from hospital. TheraPEP improves secretion clearance, facilitates opening of airways and may be used for the treatment of atelectasis.

Easy to tolerate.

TheraPEP may reduce the need for postural drainage, and is ideal for patients unable to tolerate conventional chest physiotherapy.

Easy to read.

Highly visible pressure indicator provides immediate, visual feedback from any angle.

Easy to adjust.

Six fixed orifice options allow physicians to prescribe appropriate flow resistance levels for each patient.

Easy to carry.

Draw-string bag lets patients carry TheraPEP conveniently and discreetly.

Easy to clean.

Durable plastic construction, removable base, and linear, valved resistor promotes easy cleaning.

Easy to order.

To order your TheraPEP, or a free catalog of DHD quality respiratory care products, call toll-free today.

1-800-847-8000

TheraPEP®
Positive Expiratory Pressure Therapy System

ISO CERTIFIED 9001 DHD HEALTHCARE

DHD Healthcare
Innovations for respiratory care.

Canastota, NY 13032 USA (315) 697-2221 FAX: (315) 697-8083
Customer Service FAX: (315) 697-5191 http://www.dhd.com

AARC ZENITH AWARD 1996

Circle 109 on reader service card

We Raised The Standard.

The Quantum™ PSV With Adjustable Risetime. Think Of It As Comfort Control.

Before Quantum™ PSV, adult patients had to "go with the flow" when it came to comfortable pressure delivery. But now there's a non-invasive pressure support ventilator that lets you specify the Risetime (rate of change from EPAP to IPAP), tailoring therapy to each patient's comfort level.

Adjustment is as easy as a twist of a knob, but you'll be surprised at the difference Risetime makes in terms of performance and overall patient satisfaction.

Quantum PSV features digital encoders and easy-to-read displays for fast, accurate set-up. It also gives you a maximum pressure level for therapeutic flexibility.

For information on more effective, comfortable pressure support ventilator therapy, call 1-800-421-8754. When it comes to patient comfort, nothing rises to the occasion like Quantum PSV.

HEALTHDYNE TECHNOLOGIES
Inspired by Tomorrow™

Healthdyne Technologies • 1255 Kennestone Circle • Marietta, GA 30066
1-800-421-8754 • (770) 499-1212 • FAX: (770) 499-0117

Sleep • Respiratory • Monitoring • Asthma

Circle 119 on reader service card

RESPIRATORY CARE

A Monthly Science Journal. Established 1956. Official Journal of the American Association for Respiratory Care.

EDITOR

Pat Brougher BA RRT

MANAGING EDITOR

Ray Masferrer BA RRT

EDITORIAL BOARD

James K Stoller MD, Chairman
Cleveland Clinic Foundation
Cleveland, Ohio

Richard D Branson RRT
University of Cincinnati
Medical Center
Cincinnati, Ohio

Crystal L Dunlevy EdD RRT
Atlanta, Georgia

Charles G Durbin Jr MD
The University of Virginia
Health Sciences Center
Charlottesville, Virginia

Dean R Hess PhD RRT
Massachusetts General Hospital
Harvard Medical School
Boston, Massachusetts

Neil R MacIntyre Jr MD
Duke University Medical Center
Durham, North Carolina

Shelley C Mishoe PhD RRT
Medical College of Georgia
Augusta, Georgia

Joseph L Rau PhD RRT
Georgia State University
Atlanta, Georgia

Contents ...

June 1997
Volume 42, Number 6

EDITORIALS

599 Avoiding the 'Tower of Babel' in RESPIRATORY CARE
by Robert R Fluck Jr—Syracuse, New York

601 The Manuscript Preparation Guide: Revisited and Revised
by Kris Williams—Dallas, Texas and Dean R Hess—Boston, Massachusetts

ORIGINAL CONTRIBUTIONS

604 Does a Ventilatory Management Protocol Improve the Care of Ventilated Patients?
by Hélène Djunaedi, Pierre Cardinal, Ginette Greffe-Laliberté, Gwynne Jones, and Ba' Pham—Ottowa, Ontario, Canada, and Cathy Carter Snell—Calgary, Alberta, Canada

611 Evaluation of an Assessment Tool for Equipment Management (ATEM) of Home Oxygen Concentrators
by Karen M Pfaff, Larry E Johnson, Phillip J Savage, and John R Kues—Cincinnati, Ohio

POINTS OF VIEW

617 Does It Make Sense To Heat Gases Higher than Body Temperature for the Treatment of Cold Water Near-Drowning or Hypothermia?
by Wayne Wallace—Kodiak, Alaska

TEST YOUR RADIOLOGICAL SKILL

620 What's with the Massive Hemoptysis?
by Sarah J Jung—Rochester, Minnesota

GUIDELINES, RECOMMENDATIONS, & STATEMENTS

623 Uniform Requirements for Manuscripts Submitted to Biomedical Journals
by Members of the International Committee of Medical Journal Editors

635 World Medical Association Declaration of Helsinki: Recommendations Guiding Physicians in Biomedical Research Involving Human Subjects

637 RESPIRATORY CARE Standard Abbreviations and Symbols

643 Revised Manuscript Preparation Guide

Someday, the future will lie in his hands. For now, his future lies in yours.

Announcing the Infant *Star*® Ventilator Series. Designed to grow with your changing needs.

Your patient deserves a successful future. We just happen to feel the same about infant ventilators. It's a commitment that's thriving in the form of our new Infant *Star* Ventilator Series. Adaptable, upgradable, anti-obsolescent ventilators for every facet of infant ventilatory support.

The Infant *Star* 500 provides:

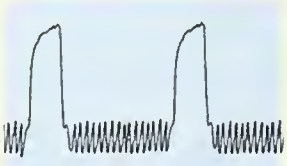
- *Conventional Neonatal/Pediatric ventilation*
- *Rapid response patient-triggered ventilation*
- *Upgradable, anti-obsolescence platform*

The Infant *Star* 950 has the identical control panel:

- *Plus, two HFOV modes*
- *No need for costly retraining of clinical or biomedical staff*

The Infant *Star* 500 and 950 ventilators provide unprecedented flexibility while reducing the cost of providing advanced ventilatory care.

For more information or a product demo, contact your Nellcor Puritan Bennett representative today at 1-800-NELLCOR. The Infant *Star* Ventilator Series—it makes the future worth looking forward to.



The Infant Star 950 gives you a choice of two high frequency modes (HFV only or HFV with IMV) by simply turning a switch.

NELLCOR PURITAN BENNETT™

VENTILATORS

Star is a trademark of Nellcor Puritan Bennett Inc. All rights reserved
© 1997 Nellcor Puritan Bennett Inc. A-FRM242-00 (3/97)

ASSISTANT EDITOR
Kris Williams BA

EDITORIAL ASSISTANT
Linda Barcus BBA

PRODUCTION COORDINATOR
Karen Singleterry BS

SECTION EDITORS
Robert R Fluck Jr MS RRT
MS Jastremski MD
Blood Gas Corner

Hugh S Mathewson MD
Drug Capsule

John O Nilsestuen PhD RRT
Ken Hargett BS RRT
Robert Harwood MSA RRT
Graphics Corner

Richard D Branson RRT
Robert S Campbell RRT
Kittredge's Corner

Charles G Irvin PhD
Jack Wanger MBA RPFT RRT
PFT Corner

Patricia Ann Doorley MS RRT
Charles G Durbin Jr MD
Test Your Radiologic Skill

Barbara Wilson MEd RRT
Jon Meliones MD
John Palmisano RRT
Cardiorespiratory Interactions

CONSULTING EDITORS
Frank E Biondo BS RRT
Howard J Birenbaum MD
Robert L Chatburn RRT
Donald R Elton MD
Ronald B George MD
James M Hurst MD
Robert M Kacmarek PhD RRT
Michael McPeck BS RRT
David J Pierson MD
John Shigeoka MD
Jeffrey J Ward MEd RRT

PRODUCTION
Donna Knauf

PUBLISHER
Sam P Giordano MBA RRT

MARKETING
Dale Griffiths
Director
Tim Goldsbury
Director of Advertising Sales
Beth Binkley
Advertising Assistant

EDITORIAL OFFICE
11030 Ables Lane
Dallas TX 75229
(972) 243-2272

... Contents

June 1997
Volume 42, Number 6

HISTORICAL NOTE

648 "Pulmonary Edema" from Effective Inhalation Therapy
by Edwin R Levine MD & published by National Cylinder Gas Co in 1953 pages 104-108 submitted by Teri Nikolai Wilson—Dayton, Ohio

BOOKS, FILMS, TAPES, & SOFTWARE

650 Pulmonary/Respiratory Therapy Secrets
reviewed by Robert L Wilkins—Loma Linda, California

650 Respiratory Care Case Studies: The Therapist-Driven Protocol Approach
reviewed by Randy De Kler—Atlanta, Georgia

LETTERS TO THE EDITOR

652 Asthma & SCUBA Diving
by Ginger E Benlifer—Pound Ridge, New York

652 A Continuing Role in the ICU
by Jinnyi L Walker—Morganfield, Kentucky

652 Capnography—Another Tool
by Kimberly Watkins—Providence, Kentucky

652 Graphics & Patient Assessment
by Summer Garrett—Henderson, Kentucky

653 Emergency Room Staffing
by Christy Murray—Livermore, Kentucky

IN THIS ISSUE

592 AARC Membership Application
582 Abstracts from Other Journals
664 Advertisers Index & Help Lines
664 Author Index
657 Calendar of Events
655 MedWatch
660 New Products & Services
662 Notices

RESPIRATORY CARE (ISSN 0020-1324, USPS 0489-190) is published monthly by Daedalus Enterprises Inc, at 11030 Ables Lane, Dallas TX 75229-4593, for the American Association for Respiratory Care. One volume is published per year beginning each January. Subscription rates are $65 per year in the US; $80 in all other countries (for airmail, add $84).

The contents of the Journal are indexed in Hospital and Health Administration Index, Cumulative Index to Nursing and Allied Health Literature, Excerpta Medica, and RNdex Library Edition. Abridged versions of RESPIRATORY CARE are also published in Italian and Japanese, with permission from Daedalus Enterprises Inc.

Periodicals postage paid at Dallas TX and at additional mailing offices. POSTMASTER: Send address changes to RESPIRATORY CARE, Membership Office, Daedalus Enterprises Inc, 11030 Ables Lane, Dallas TX 75229-4593.

Printed in the United States of America
Copyright © 1997, by Daedalus Enterprises Inc.

Editorials, Commentaries, and Reviews To Note

Users' Guides to the Medical Literature: XII. How To Use Articles About Health-Related Quality of Life (Special Article)—GH Guyatt, CD Naylor, E Juniper, DK Heyland, R Jaeschke, DJ Cook, for the Evidence-Based Medicine Working Group. JAMA 1997;277(15):1232-1237.

Assessing, Controlling, and Assuring the Quality of Medical Information on the Internet: *Caveant Lector et Viewor*—Let the Reader and Viewer Beware (Editorial)—B Silberg, G Lundberg, R Musacchio. JAMA 1997;277(15):1244-1245.

Biological Markers of Acute Lung Injury: Prognostic and Pathogenetic Significance (State of the Art)—JF Pittet, RC Mackersie, TR Martin, MA Matthay. Am J Respir Crit Care Med 1997;155: 1187-1205.

High-Dose Epinephrine Is Not Superior to Standard-Dose Epinephrine in Pediatric In-Hospital Cardiopulmonary Arrest—TC Carpenter, KR Stenmark. Pediatrics 1997;99(3):403.

OBJECTIVE: To compare the efficacy of high-dose epinephrine (HDE) with that of standard-dose epinephrine (SDE) for resuscitation from in-hospital pediatric cardiopulmonary arrest (CPA). DESIGN: Fifty-four-month retrospective study of all pediatric patients who had a CPA while hospitalized at a tertiary care children's hospital. Standard pediatric advanced life support techniques were used for all patients. Patients received HDE or SDE in accordance with physician orders and standard protocols at the time of CPA. Primary outcome measures were the return of spontaneous circulation (ROSC), the duration of survival after resuscitation, survival to hospital discharge, and Pediatric Overall Performance Category scores at the time of discharge. RESULTS: During the study period, 51 patients met entry criteria and had a total of 58 CPAs. Twenty-one patients received HDE during resuscitation from 24 arrests, at a dose of 0.12 ± 0.05 mg/kg (mean ± SD); 30 patients received SDE during resuscitation from 34 arrests, at a dose of 0.01 ± 0.01 mg/kg (mean ± SD). The HDE and SDE groups were not significantly different in terms of gender, initial cardiac rhythm, location of CPA, primary diagnoses at the time of CPA, initial pH, or additional resuscitation medications received; the SDE group had a significantly higher mean age, although the median ages were not different. Fourteen of 24 resuscitations using HDE resulted in ROSC (58%) with a mean time to ROSC of 19 minutes; 7 (29%) of 24 led to survival for 24 hours, and 6 (26%) of 23 patients survived to hospital discharge, all with moderate to severe neurologic and functional impairment. Twenty-four of 34 resuscitations using SDE resulted in ROSC (71%) with a mean time to ROSC of 12 minutes; 17 (50%) of 34 led to survival for 24 hours; and 7 (23%) of 30 patients survived to hospital discharge, 4 with mild to moderate neurologic impairment. No significant differences in rates of ROSC, survival rates, or Pediatric Overall Performance Category scores of survivors were found between the 2 groups. The mean time to ROSC was significantly longer in the HDE group. CONCLUSIONS: In this study, the use of HDE did not improve the rates of ROSC, short-term survival, or long-term survival after pediatric in-hospital CPA, nor did it improve overall outcome scores. Given the conflicting evidence surrounding possible detrimental effects of HDE use, a large, blinded, prospective trial of HDE use in this setting is necessary to clarify the appropriate role for HDE in pediatric resuscitation.

Respiratory Syncytial Virus (RSV) Immune Globulin Intravenous Therapy for RSV Lower Respiratory Tract Infection in Infants and Young Children at High Risk for Severe RSV Infections—WJ Rodriguez, WC Gruber, RC Welliver, JR Groothuis, EAF Simoes, HC Meissner, et al, for the Respiratory Syncytial Virus Immune Globulin Study Group. Pediatrics 1997;99 (3):454.

OBJECTIVES: To evaluate the efficacy of high-titer intravenous respiratory syncytial virus immune globulin (RSVIG) in the treatment of children at high risk for severe RSV infection who were hospitalized with proven RSV. METHODS: Infants and young children younger than 2 years with bronchopulmonary dysplasia, chronic lung disease, congenital heart disease, or prematurity (< 32 wk gestational age), hospitalized with a history of lower respiratory tract infection (LRI) of less than 4 days, were enrolled in this study. Patients were randomized in a blinded fashion to receive either 1,500 mg/kg RSVIG or placebo in equal volumes. They were evaluated daily for safety and respiratory scores and for RSV nasal shedding. RESULTS: One hundred seven high-risk children were randomized—54 in the RSVIG group and 53 in the placebo group. Of these children, 51 in each group were considered evaluable. Children with pulmonary disease, congenital heart disease, or prematurity were equally distributed between the 2 treatment groups. However, 2 important differences were found in baseline variables between the 2 groups: there were more patients in the placebo group who had histories of previous LRI and there was a trend toward more severe disease at study entry in the RSVIG group. This was manifested by a higher entry respiratory score in the RSVIG group than in the placebo group (3.4 ± 0.2 vs 3.1 ± 0.01). A higher proportion of children in the RSVIG group (47%) than in the placebo group (28%) required intensive care at entry and mechanical ventilation at study entry (31% RSVIG-treated vs 18% placebo-treated patients). No significant difference was found between groups in the mean unadjusted duration of hospitalization (RSVIG group, 9.10 ± 1.18 days; control group, 8.17 ± 1.08 days). When the mean was adjusted for entry respiratory score, likewise, no difference was observed between each group (8.41 ± 0.97 vs 8.89 ± 0.99 days). The lack of efficacy observed in the study primary endpoint was observed in all diagnostic groups. No differences between the RSVIG and placebo groups were observed in the following secondary endpoints: duration of intensive care unit stay, duration of intensive care unit stay for RSV, mechanical ventilation, or supplemental oxygen. No significant differences in adverse events were reported in the RSVIG group (16 children) when compared with the control group (10 children). CONCLUSION:

New in 1997

HealthScan didn't invent the valved holding chamber.

We optimized it.

Op • ti • mize *vt* [L *optimum*, *n.*, best]: 1. to improve to the greatest extent possible; 2. to use most effectively

We took a hard look at the leading valved holding chamber...and found room for improvement — a 50% *increase* in volume. This extra volume means more fine particle dose is available for inhalation.[1]

Designed to Optimize Drug Delivery

OptiChamber™, HealthScan's valved holding chamber, makes available *more of the smaller medication particles* — those that reach deep down into the peripheral airways.[1-2] And OptiChamber is *clinically* proven to produce rapid lung function improvement with salbutamol (albuterol).[3]

Designed to Optimize Patient Value and Ease-of-Use

Best of all, OptiChamber delivers exceptional value. A replaceable one-way valve results in longer trouble-free performance. Detachable masks adapt to changing patient needs and help keep patient costs to a minimum.

New OptiChamber. Holding chamber technology...*optimized.*

REFERENCES: 1. Data on file, HealthScan Products Inc. Results of aerosol testing with albuterol, beclomethasone, and cromolyn sodium. 2. Data on file, HealthScan Products Inc. Results of gamma-scintigraphy aerosol deposition studies. 3. Gibson PG, Wlodarczyk JH, Borgas T: Drug delivery in asthma: A comparison of spacers with a jet nebuliser. *Aust NZ J Med* 25:324-329, 1995.

© 1997, HealthScan Products Inc. Patent No. 5,385,140
OC0297-0 Made and printed in USA

Circle 108 on reader service card

For a free professional sample
call **1-800-962-1266**, fax us at 201-239-0831
or return coupon below to:

HEALTHSCAN PRODUCTS INC. a division of HEALTHDYNE® TECHNOLOGIES

OptiChamber™ RC 06/97

Valved Holding Chamber
For Use With Metered Dose Inhalers

Please send me a sample of: ❑ OptiChamber™
❑ Small Mask ❑ Medium Mask ❑ Large Mask

Name Specialty

Address

City State Zip

Telephone OC0297-0

Mail to: HealthScan Products Inc.
908 Pompton Ave., Cedar Grove, NJ 07009-1292 USA

RSVIG treatment was safe but not efficacious in the treatment of children with bronchopulmonary dysplasia, congenital heart disease, or premature gestation who were hospitalized with RSV LRI. *See the related commentary:* ***Reducing the Morbidity of Lower Respiratory Tract Infections Caused by Respiratory Syncytial Virus: Still No Answer***—*CG Prober, EEL Wang. Pediatrics 1997;99(3):472-475.*

Factors Associated with Emergency Department Dependence of Patients with Asthma—NA Hanania, A David-Wang, S Kesten, KR Chapman. Chest 1997;111(2):290.

BACKGROUND: Dependence on crisis-oriented care rather than continuous ambulatory care for asthma is thought to contribute to asthma morbidity and mortality. We contrasted the characteristics of patients who depend on emergency department (ED) care for the management of their asthma exacerbations to the characteristics of patients employing self-management plans in an ambulatory setting. METHODS: In prospective fashion, we used a structured interview and charted information to survey 2 cohorts of patients suffering from an acute exacerbation of asthma: those seen in a hospital ED (n = 80) and those seen in an ambulatory asthma care facility (Asthma Center [AC]) (n = 40) at the same hospital. We looked for differences in socioeconomic characteristics, asthma severity, asthma knowledge, and asthma self-management skills between groups. RESULTS: There were no significant differences in mean age (SD) (ED vs AC: 36.65 [13.8] vs 40 [13.8] yr) or female-to-male ratio (ED vs AC: 2/1 vs 2.5/1) between the 2 groups. There were no major differences in ethnic origin, educational status, marital status, smoking history, employment status, number of children in the household, possession of an extended health insurance plan, sick leave benefits, and child care availability between the 2 groups. Patients seeking ED care were more likely to have resided in the city for < 5 years (34% vs 8%; $p < 0.05$), and more likely to be living alone (35% vs 15%; $p < 0.05$). Significantly more patients from the ED group had a below average gross annual income (55% vs 3%; $p < 0.05$). There were several significant differences between groups in their knowledge of asthma and its therapy. Most striking, 79% of AC patients reported having a predetermined crisis plan versus just 23% of ED patients ($p < 0.001$). Although measurements of airflow (percent predicted FEV_1) were significantly lower in the ED group than the AC group (mean, 50% vs 78.4%; $p < 0.001$), other indexes reflecting the degree of asthma severity over the long term such as past use of oral steroids, history of hospitalization, or ICU admission for asthma and the mean total days of disability within the preceding year were not significantly different between the 2 groups. Most of the ED patients had more than one previous visit to the ED for asthma exacerbation within the preceding year while most exacerbations of AC patients had been treated in the ambulatory care setting. Only 17% of ED patients initiated or increased inhaled or oral steroids before seeking medical care versus 89% of AC patients ($p < 0.001$). CONCLUSION: We conclude that a subgroup of asthmatics depends primarily on crisis-oriented care for the management of asthma. These patients are more likely to have lower income, to live alone, and to have resided at their current address for less time than patients seeking less urgent ambulatory care. Moreover, such patients are less knowledgeable about asthma and its management and are less likely to have a predetermined crisis plan.

Prehospitalization Inhaled Corticosteroid Use in Patients with COPD or Asthma—C Jackevicius, DP Joyce, S Kesten, KR Chapman. Chest 1997;111(2):296.

BACKGROUND: Guidelines for the treatment of obstructive lung diseases suggest a primary role of inhaled corticosteroids (ICs) in asthma, but only a minor role in COPD. However, surveys of physicians' prescribing habits have suggested that there is little difference in the use of ICs between these 2 conditions. OBJECTIVES: To determine the prevalence of IC use before and during hospitalization among patients with COPD or asthma. DESIGN: Retrospective chart review. SETTING: Tertiary care university teaching hospital. PATIENTS: Adult inpatients, aged 18 or older, with physician-diagnosed COPD or asthma. MEASUREMENTS: Patient-reported prescription drug use at hospital admission, and medical chart record of in-hospital and discharge prescriptions. RESULTS: Of 350 charts reviewed, 102 patients were admitted to the hospital for unstable COPD, 133 patients had stable COPD, 36 patients were admitted with unstable asthma, and 79 patients had stable asthma. At hospital admission, 48% of unstable COPD patients, 26% of stable COPD patients, 56% of unstable asthma patients, and 44% of stable asthma patients reported having a current prescription for ICs. The proportion of all asthmatic patients reporting a current prescription for ICs at admission (48%) was significantly higher than the proportion of all COPD patients receiving an IC at admission (35%). However, there was no significant difference in the proportion of COPD and asthma patients with a current prescription of any form of corticosteroid (oral or inhaled). The proportion of COPD patients likely to respond to IC therapy is significantly different from the observed use at hospital admission. CONCLUSIONS: The proportion of patients found to be using ICs is much higher than the proportion expected to respond. There was little difference in the use of ICs for asthma and COPD patients at hospital admission. Most COPD patients using an IC were receiving the regimen on admission to hospital, indicating that there is need for education in the community and in the hospital regarding use of ICs in COPD patients.

Incidence and Outcomes of Asthma in the Elderly: A Population-Based Study in Rochester, Minnesota—BA Bauer, CE Reed, JW Yunginger, PC Wollan, MD Silverstein. Chest 1997; 111(2):303.

OBJECTIVE: To estimate the incidence of asthma in an elderly population and to describe the clinical characteristics, use of health services, and long-term survival of persons with onset of asthma after age 65 years. DESIGN: Retrospective cohort study. SETTING: Rochester, Minn. PATIENTS: All Rochester, Minn, residents age 65 years or older who met criteria for onset of definite or probable asthma from 1964 through 1983. INTERVENTIONS: None. MEASUREMENTS & RESULTS: Ninety-eight Rochester residents (52 female, 46 male) with onset of asthma at or after age 65 years were identified. The age- and sex-adjusted incidence was 95/100,000 (95% confidence interval, 76 to 115/100,000). The age-specific incidence of asthma was 103/100,000 in residents aged 65 to 74 years, 81/100,000 in those aged 75 to 84 years, and 58/100,000 in residents older than 85 years. Only 11% had allergy skin tests, 24% had at least 1 office peak flow measurement, and 43% had at least 1 spirometry measurement. After the diagnosis of asthma, 40% had unscheduled ambulatory visits, 22% had emergency department visits, and 42% had at least 1 hospitalization for asthma. Observed survival was not significantly different from expected survival. CONCLUSIONS: Asthma is common in the elderly. Diagnostic evaluation was less intensive than present guidelines recommend. Following the diagnosis of asthma, a substantial proportion of these individuals required unscheduled ambulatory visits, emergency department visits, or hospitalizations. Asthma with onset after age 65 years was not associated with reduced survival.

Long-Term Change in Exercise Capacity, Body Mass, and Pulmonary Function in Adults with Cystic Fibrosis—AJ Moorcroft, ME Dodd, AK Webb. Chest 1997;111(2):338.

OBJECTIVES. Cross-sectional studies in patients with cystic fibrosis (CF) have shown that exercise capacity is correlated with pulmonary function and body mass. We have examined whether the same relationships are seen longitudinally in adults with CF. DESIGN: Subjects who first performed progressive maximal cycle ergometry between 1986 and 1989 were retested using an identical protocol a mean of 6.3 years later. PARTICIPANTS & SETTING: Adults with CF attending a regional center. MEASUREMENTS & RESULTS: The principal exercise measures were peak oxygen uptake ($\dot{V}_{O_2peak}$), ventilation ($\dot{V}_{Epeak}$), oxygen saturation, and heart rate. Spirometry, weight, and height were also recorded at each time point. At baseline, subjects had a mean age of 19.8 years, body mass index (BMI) of 19.0, FEV_1 of 69% predicted, $\dot{V}_{O_2peak}$ of 1.56 L/min, and $\dot{V}_{Epeak}$

of 48.9 L/min. At repeated testing after a mean interval of 6.3 years, the FEV_1 had fallen significantly to 54% predicted ($p < 0.001$) and the BMI had risen significantly to a mean of 20.9 ($p < 0.001$). There were no significant differences in $\dot{V}_{O2peak}$ or $\dot{V}_{Epeak}$, although $\dot{V}_{Epeak}$ was a significantly higher proportion (72% vs 61%) of predicted maximal voluntary ventilation. CONCLUSIONS: Adults with mild to moderate pulmonary dysfunction were able to increase body mass and maintain $\dot{V}_{O2peak}$ despite a declining FEV_1. $\dot{V}_{O2peak}$ was not reduced by the decrease in FEV_1 because $\dot{V}_{Epeak}$ was unaffected. Improved nutrition may have contributed to maintaining fitness.

The Clinical Efficacy of Combination Nebulized Anticholinergic and Adrenergic Bronchodilators vs Nebulized Adrenergic Bronchodilator Alone in Acute Asthma—JM FitzGerald, A Grunfeld, PD Pare, RD Levy, MT Newhouse, R Hodder, KR Chapman, and the Canadian Combivent Study Group. Chest 1997; 111(2):311.

The role of ipratropium bromide as adjunct therapy to β-agonists in acute asthma is uncertain. We therefore decided to compare the use of 3 mg of salbutamol sulfate alone versus 3 mg salbutamol sulfate with 0.5 mg ipratropium bromide in patients with acute asthma. Patients presenting with acute asthma and an $FEV_1 < 70\%$ predicted were randomized to a single combination treatment versus salbutamol alone. All patients received supplemental oxygen and methylprednisolone, 125 mg, I.V. Baseline measurements were repeated at 45 and 90 minutes and these included spirometry, oximetry, and vital signs. A total of 952 patients were screened of whom 342 patients were deemed eligible and were randomized in 2 groups of 171 patients. The mean (SE) age was 30 years (0.9) versus 29 years (0.7), women, 103 (60.2%) versus 110 (64%), 81 (47.4%) never-smoked versus 83 (48.5%), and duration of asthma in years 16.0 (0.8) versus 16.6 (0.8) were no different in the combination versus salbutamol-alone group, respectively. Likewise, there was no significant difference in asthma therapy received in the 24 hours prior to presentation; most notably, 151 (88.3%) versus 153 (89.5%) received inhaled β-agonists in that period. Baseline FEV_1 was 1.62 L (0.05 L) versus 1.53 L (0.03 L), and median time to treatment being received was no different between both groups. Both treatment arms improved significantly. The increase in FEV_1 in the combination group was 0.61 L (0.04 L) and in the salbutamol-alone group was 0.52 L (0.04 L) at 90 minutes. There was a trend toward greater bronchodilatation in the combination group, but this did not reach statistical significance. Fewer hospitalizations, 5.9% versus 11.2%, occurred in the combination group, but this did not reach statistical significance. In conclusion, this large multicenter study failed to show a significantly better response to a combination of salbutamol and ipratropium bromide versus salbutamol alone.

The Impact of Gender on Outcome from Mechanical Ventilation—MH Kollef, JD O'Brien, P Silver. Chest 1997;111(2):434.

OBJECTIVE: To determine the relation of gender to outcome for patients requiring mechanical ventilation. DESIGN: A prospective cohort study. SETTING: Medical and surgical ICUs in 2 university-affiliated teaching hospitals. PATIENTS: Three hundred fifty-seven patients requiring mechanical ventilation. INTERVENTIONS: Prospective patient surveillance and data

Advance Your Healthcare Career!

Earn Your Degree at Home!

Achieve Success Through Distance Education!

Get the educational credentials you need to advance your career — without spending extra time and money attending an on-campus university. Choose from California College for Health Sciences' exciting line-up of Associate, Bachelor's, and Master's Degree Programs. You'll enjoy the benefits that come with respected credentials in any one of 10 fast growing healthcare specialties.

- Accredited member, Distance Education and Training Council.
- You can receive credit for work experience or previous college-level education.

CALL OR SEND FOR FREE INFORMATION!

1-800-961-6409 ext. 894

http://www.cchs.edu

No obligation. Act today!

Call today or send this coupon to:

CALIFORNIA COLLEGE FOR HEALTH SCIENCES
Dept. 894
222 West 24th St.
National City, CA 91950
FAX: (619) 477-4360
cchsinfo@cchs.edu

YES! I want to find out more about continuing my professional education at home with California College for Health Sciences. No obligation. Act today! ***Choose one of the following accredited Degree Programs:***

CC133

School of Health Sciences

Associate of Science
- ☐ Respiratory Technology
- ☐ EEG Technology
- ☐ Medical Transcription
- ☐ Early Childhood Education
- ☐ Respiratory Therapy
- ☐ Allied Health

Bachelor of Science
Emphasis in:
- ☐ Respiratory Care
- ☐ Management

Master of Science
- ☐ Community Health Administration and Wellness Promotion

Certificate Program
- ☐ Polysomnography

School of Business

Associate of Science
Major in:
- ☐ Accounting
- ☐ Finance
- ☐ Marketing
- ☐ Economics
- ☐ Management
- ☐ Business

Bachelor of Science
Major in:
- ☐ Accounting
- ☐ Finance
- ☐ Marketing
- ☐ Economics
- ☐ Management
- ☐ Business

Name _____
Address _____ Apt. # _____
City/State _____ Zip _____
Phone ( ) _____ E-mail _____
Hospital/Facility _____ Phone ( ) _____

Circle 136 on reader service card

MARKETPLACE

A

To celebrate its 50th year, the AARC is offering several anniversary items to commemorate this important milestone in respiratory care. There's no time like 1997 — the AARC's 50th year — to show your pride in the respiratory care profession.

50th Anniversary Poster

A This 17" by 22" poster is a collage of photos that showcase the last 50 years of the respiratory care profession.

Item AN18 $6 ($10 nonmembers)

Business Card Holder

B Black leatherette business card holder displays the 50th anniversary logo in gold. Great place to keep those business cards handy!

Item AN16 $5 ($7.50 nonmembers)

B

To Order by Credit Card or Purchase Order, Call the AARC at (972) 243-2272.

C

Anniversary Polo Shirt

C Walk around in style in this cotton knit polo-style shirt with embroidered 50th anniversary logo. This banded-sleeve shirt has a four-button placket and knit collar. Forest green only. Sizes L, XL, and XXL.

Item AN15 $45 ($60 nonmembers)

Brass Money Clip

D This brass money clip, etched with the 50th anniversary logo in dark blue, holds bills securely in your pocket. Classic souvenir of the AARC's 50 years.

Item AN10 $10 ($15 nonmembers)

D

E

Letter Opener

E Open your mail with ease. Letter opener features the 50th anniversary logo.

Item AN17 $1 ($1.50 nonmembers)

E-Cylinder Key Ring

F Carry your keys on this soft vinyl e-cylinder–shaped key ring.

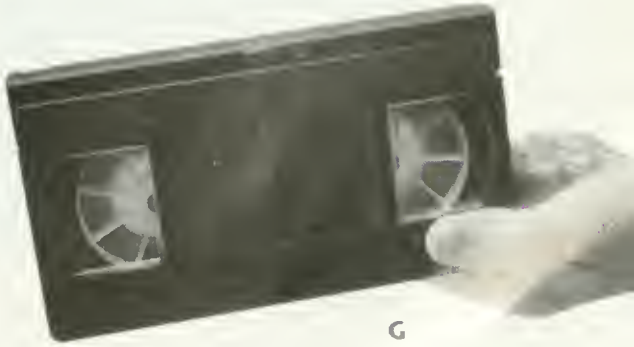
Item AN14 $1 ($1.50 nonmembers)

F

50th Anniversary Video

G This 17-minute video traces the AARC's history since its birth in 1947 as the Inhalational Therapy Association.

Item AN19 $10 ($15 nonmembers)



G

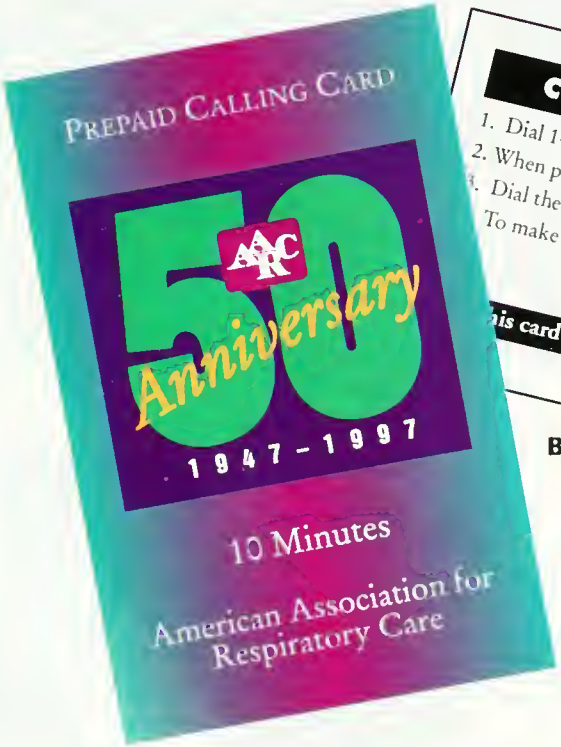
MARKETPLACE

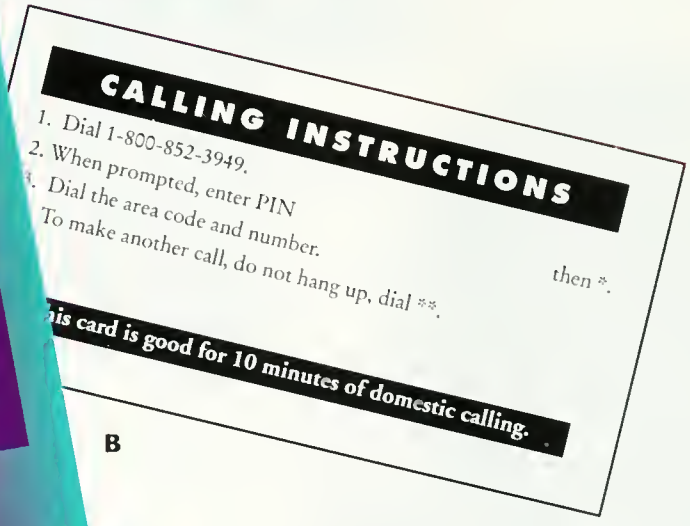
A

50th Anniversary Jansport Backpack

A Nothing speaks quality and durability like a Jansport Backpack. Available in black with a brown-suede bottom and the AARC's 50th anniversary logo embroidered in gold. Roomy inside, with outside zipper pocket.

Item AN11 $39 ($50 nonmembers)




CALLING INSTRUCTIONS
1. Dial 1-800-852-3949.
2. When prompted, enter PIN
3. Dial the area code and number.
To make another call, do not hang up, dial **.
then *.
his card is good for 10 minutes of domestic calling.

B

50th Anniversary Calling Card

B No need to carry change in your pocket — use this convenient prepaid calling card instead. Good for 10 minutes of domestic calli

Item CONV5 $1.50 ($5 nonmembers)

Minimum purchase: 5 cards.

To Order by Credit Card or Purchase Order, Call the AARC at (972) 243-2272.

C

Magic Mug

C Celebrate the AARC's 50 years with this unique, fun mug. Just pour in your favorite hot beverage and watch the 1947 logo on your magic mug fast-forward to 1997! Dishwasher use not recommended.

Item AN12 $10 ($12.50 nonmembers)

Mouse Pad

D Use this soft foam mousepad with futuristic design and never forget the AARC's web address: **http://www.aarc.org** — it's right at your fingertips!

Item R20 $6 ($8 nonmembers)

E

Swiss-style Army Knife

E This handy swiss-style army knife goes everywhere with you. Tucked inside is a knife, file, scissors, and toothpick. Comes in its own leather-like pouch.

Item AN13 $9 ($12 nonmembers)

D

collection. MEASUREMENTS & RESULTS: The primary outcome measure was hospital mortality. Secondary outcome measures included need for reintubation, hospital and ICU length of stay, duration of mechanical ventilation, and hospital charges. The hospital mortality rate for women (n = 189) was significantly greater than the hospital mortality rate for men (n = 168) (28.0% vs 17.3%; p = 0.016). This difference in hospital mortality was observed despite similar baseline demographic characteristics, severity of illness, indications for mechanical ventilation, and number of dysfunctional organ systems in these 2 groups of patients. The duration of mechanical ventilation and ICU length of stay was also significantly longer for female patients compared with male patients ($p \leq 0.056$). In a logistic-regression analysis, female gender was found to be independently associated with hospital mortality (adjusted odds ratio [AOR] = 2.38; 95% confidence interval [CI] = 1.70-3.35; p = 0.010). The presence of ARDS (AOR = 10.69; 95% CI = 5.86 to 19.51; $p < 0.001$), the number of dysfunctional organ systems (AOR = 2.07; 95% CI = 1.78-2.41; $p < 0.001$), Acute Physiology and Chronic Health Evaluation (APACHE) II predicted mortality (AOR = 1.15; 95% CI = 1.11-1.19; $p < 0.001$), and patient age (AOR = 1.04; 95% CI = 1.03 to 1.06; $p < 0.001$) were also found to be independently associated with hospital mortality. The number of dysfunctional organ systems present at the start of mechanical ventilation was the major independent predictor of hospital mortality (54% of total explanatory power). Patient gender was the least important independent predictor of hospital mortality (5% of total explanatory power). CONCLUSIONS: In this patient cohort, women requiring mechanical ventilation were at greater risk for hospital mortality than men. Physicians should be aware that outcome differences according to gender can occur when evaluating or designing clinical trials involving mechanically ventilated patients. Future studies are necessary to determine the general applicability of these findings and to identify explanations for such observed gender-specific differences in outcome.

Prolonged "Phantom" Square Wave Capnograph Tracing after Patient Disconnection or Extubation: Potential Hazard Associated with the Siemens Servo 900c Ventilator—Y Ginosar, D Baranov. Anesthesiology 1997;86(3):729.

BACKGROUND: The authors report on the appearance of misleading square wave "phantom" capnograph tracings for approximately 3 minutes after disconnection from the Siemens Servo 900c ventilator. A series of experiments are described to examine the mechanism of this phenomenon. METHODS: Patients were ventilated using the Siemens Servo 900c ventilator with the following settings: minute volume, 5 L/min; respiratory rate, 8 breaths/minute; PEEP, 0 cm H_2O; trigger sensitivity, 20 cm H_2O. The ventilator was connected to the Siemens Servo Evac 180 evacuation system (25 L/min on evacuation flowmeter). Airway pressure and capnography were recorded at the Y piece during ventilation and after disconnection. A back-up ventilator was used to support the patient during disconnection of the ventilator being studied. RESULTS: Initially, the "phantom" capnograph tracing closely resembled the square wave capnograph tracing before disconnection, but the amplitude and shape of the waveform gradually decayed. Based on experiments described in this article, the authors show that the carbon dioxide for the "phantom" capnograph tracing comes from the gas exhaled by the patient in the last breaths before disconnection and which is present in both the expiratory tubing and in the evacuation system. The small pressure gradient between the exhaust reservoir and the atmosphere causes reverse flow of expired gas after disconnection, when both the nonreturn flap valve at the exhaust outlet is open (due to minimal valve incompetence) and when the expiratory servo valve is open (in the absence of positive end-expiratory pressure). This continuous reverse flow is detected by the capnograph but is interrupted intermittently by each attempted positive pressure ventilation, thereby creating a "phantom" capnograph. CONCLUSIONS: After accidental disconnection of the patient from the breathing system, or after accidental extubation of the trachea, the "phantom" capnograph is likely to confuse even an experienced anesthesiologist into the mistaken belief

LOOK FOR THE RESPIRATORY CARE Special Issue

The September 1997 issue of the journal will be devoted to education—respiratory care formal programs and curriculum, continuing and in-service education, and patient education.

Original studies, state-of-the-art reviews, teaching features, and reviews of instructional materials are still being accepted for peer review and publication.

For more details, call Kris Williams, Assistant Editor, (972) 406-4665 or email williams@aarc.org

that his rapidly deteriorating patient is being ventilated adequately. Several potential mechanisms to eliminate this phenomenon are outlined, including the avoidance of zero positive end-expiratory pressure. "Phantom" capnography provides an illustration of the dangers of using monitoring techniques, however reliable, as a substitute for vigilant clinical observation.

Inaccuracies of Nitric Oxide Delivery Systems during Adult Mechanical Ventilation—H Imanaka, D Hess, M Kirmse, LM Bigatello, RM Kacmarek, W Steudel, WE Hurford. Anesthesiology 1997;86(3):676.

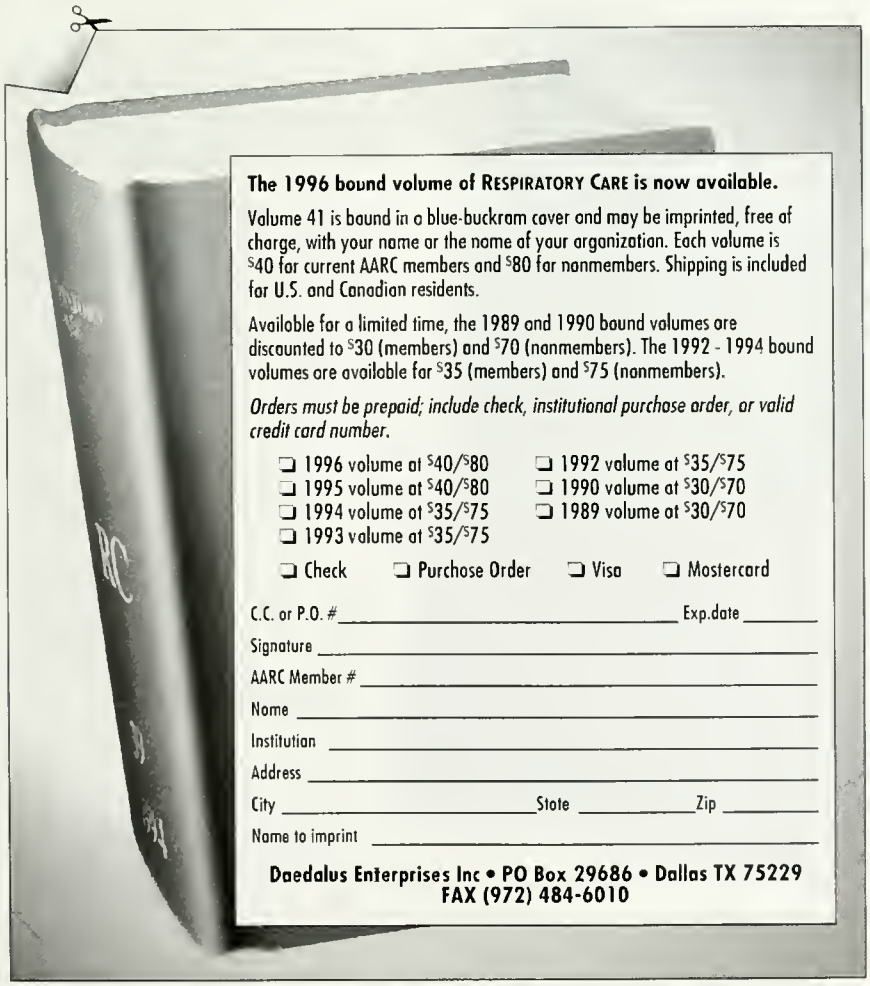
BACKGROUND: Various systems to administer inhaled nitric oxide (NO) have been used in patients and experimental animals. We used a lung model to evaluate 5 NO delivery systems during mechanical ventilation with various ventilatory patterns. METHODS: An adult mechanical ventilator was attached to a test lung configured to separate inspired and expired gases. Four injection systems were evaluated with NO injected either into the inspiratory circuit 90 cm proximal to the Y piece or directly at the Y piece and delivered either continuously or only during the inspiratory phase. Alternatively, NO was mixed with air using a blender and delivered to the high-pressure air inlet of the ventilator. Nitric oxide concentration was measured from the inspiratory limb of the ventilator circuit and the tracheal level using rapid- and slow-response chemiluminescence analyzers. The ventilator was set for constant-flow volume control ventilation, pressure control ventilation, pressure support ventilation, or synchronized intermittent mandatory ventilation. Tidal volumes of 0.5 L and 1 L were evaluated with inspiratory times of 1 second and 2 seconds. RESULTS: The system that premixed NO proximal to the ventilator was the only one that maintained constant NO delivery regardless of ventilatory pattern. The other systems delivered variable NO concentration during pressure control ventilation and spontaneous breathing modes. Systems that injected a continuous flow of NO delivered peak NO concentrations greater than the calculated dose. These variations were not apparent when a slow-response chemiluminescence analyzer was used. CONCLUSIONS: NO delivery systems that inject NO at a constant rate, either continuously or during inspiration only, into the inspiratory limb of the ventilator circuit produce highly variable and unpredictable NO delivery when inspiratory flow is not constant. Such systems may deliver a very high NO concentration to the lungs, which is not accurately reflected by measurements performed with slow-response analyzers.

Comparison of Cuffed and Uncuffed Endotracheal Tubes in Young Children during General Anesthesia—HH Khine, DH Corddry, RG Kettrick, TM Martin, JJ McCloskey, JB Rose, et al. Anesthesiology 1997;86(3):627.

BACKGROUND: Uncuffed endotracheal tubes are routinely used in young children. This study tests a formula for selecting appropriately sized cuffed endotracheal tubes and compares the use of cuffed versus uncuffed endotracheal tubes for patients whose lungs are mechanically ventilated during anesthesia. METHODS: Full-term newborns and children (n = 488) through 8 years of age who required general anesthesia and tracheal intubation were assigned randomly to receive either a cuffed tube sized by a new formula [size (mm internal diameter) = (age/4) + 3], or an uncuffed tube sized by the modified Cole's formula [size (mm internal diameter) = (age/4) + 4]. The number of intubations required to achieve an appropriately sized tube, the need to use more than 2 $L \cdot min^{-1}$ fresh gas flow, the concentration of nitrous oxide in the operating room, and the incidence of croup were compared. RESULTS: Cuffed tubes selected by our formula were appropriate for 99% of patients. Uncuffed tubes selected by Cole's formula were appropriate for 77% of patients ($p < 0.001$). The lungs of patients with cuffed tubes were adequately ventilated with 2 $L \cdot min^{-1}$ fresh gas flow, whereas 11% of those with uncuffed tubes needed greater fresh gas flow ($p < 0.001$). Ambient nitrous oxide concentration exceeded 25 parts/million in 37% of cases with uncuffed tubes and in 0% of cases with cuffed tubes ($p < 0.001$). Three patents in each group were treated for croup symptoms (1.2% cuffed; 1.3% uncuffed). CONCLUSIONS: Our formula for cuffed tube selection is appropriate for young children. Advantages of cuffed endotracheal tubes include avoidance of repeated laryngoscopy, use of low fresh gas flow, and reduction of the concentration of anesthetics detectable in the operating room. We conclude that cuffed endotracheal tubes may be used routinely during controlled ventilation in full-term newborns and children during anesthesia.

Failure of Three Decision Rules To Predict the Outcome of In-Hospital Cardiopulmonary Resuscitation—MH Ebell, JA Kruse, M Smith, J Novak, J Drader-Wilcox. Med Decis Making 1997;17:171.

The objective of this study was to evaluate 3 decision-support tools (the Pre-Arrest Morbidity or PAM score, the Prognosis After Resuscitation or PAR score, and the Acute Physiology and Chronic


The 1996 bound volume of RESPIRATORY CARE is now available.
Volume 41 is bound in a blue-buckram cover and may be imprinted, free of charge, with your name or the name of your organization. Each volume is $40 for current AARC members and $80 for nonmembers. Shipping is included for U.S. and Canadian residents.
Available for a limited time, the 1989 and 1990 bound volumes are discounted to $30 (members) and $70 (nonmembers). The 1992 - 1994 bound volumes are available for $35 (members) and $75 (nonmembers).
Orders must be prepaid; include check, institutional purchase order, or valid credit card number.
❑ 1996 volume at $40/$80
❑ 1995 volume at $40/$80
❑ 1994 volume at $35/$75
❑ 1993 volume at $35/$75
❑ 1992 volume at $35/$75
❑ 1990 volume at $30/$70
❑ 1989 volume at $30/$70
❑ Check ❑ Purchase Order ❑ Visa ❑ Mastercard
C.C. or P.O. # Exp.date
Signature
AARC Member #
Name
Institution
Address
City State Zip
Name to imprint
Daedalus Enterprises Inc • PO Box 29686 • Dallas TX 75229
FAX (972) 484-6010

Expanding the Mind is Shelley Mishoe's Prerogative with the AARC

Oliver Wendell Holmes said that once stretched by a new idea, the human mind never regains its original dimensions. For me, being a member of the American Association for Respiratory Care has greatly contributed to the expanding of my mind by helping me achieve a rewarding career in respiratory care.

I joined the AARC as a student member in 1974 because my professors expected it. However, as I began to receive new ideas, I came to realize that being a member of the AARC was fundamental to becoming a true professional. Through active membership, I have been able to stay abreast of the ever-increasing information, technology, and reforms in respiratory care. I have also been able to contribute ideas of my own by participating in AARC conferences, moderating the annual OPEN FORUM, and serving as a House of Delegates Officer and as a RESPIRATORY CARE Editorial Board member. Today, I encourage my students to join the AARC as part of their becoming a respiratory care professional. RESPIRATORY CARE, *AARC Times*, Clinical Practice Guidelines, conference proceedings, and networking with other health professionals are excellent resources for all respiratory care practitioners.

I believe that its wealth of knowledge is the AARC's most important benefit. For all of us, the AARC is an opportunity to expand our minds and to realize our full potential as respiratory care professionals.

Shelley C. Mishoe, PhD, RRT
Augusta, Georgia

Join Now!

AARC
11030 Ables Lane
Dallas, TX 75229-4593
(972) 243-2272
Fax (972) 484-2720

American Association for Respiratory Care
Membership Application

Please read the eligibility requirements for each of the classificotions in the right-hand column, then complete the applicable section. All information requested below must be provided, except where indicated as optional. See other side for more information and fee schedule. Please sign and date application on reverse side and type or print clearly. Processing of application takes approximately 15 days.

- ☐ Active
- Associate
  - ☐ Foreign
  - ☐ Physicion
  - ☐ Industrial
- ☐ Special
- ☐ Student

Last Name _____

First Name _____

Social Security No. _____

Home Address _____

City _____

State _____ Zip __ __ __ __ __-__ __ __ __

Phone No. (_____) _____

Primary Job Responsibility (check one only)

- ☐ Technical Director
- ☐ Assistant Technical Director
- ☐ Pulmonary Function Specialist
- ☐ Instructor/Educator
- ☐ Supervisor
- ☐ Staff Theropist
- ☐ Staff Technician
- ☐ Rehabilitation/Home Care
- ☐ Medical Director
- ☐ Sales
- ☐ Student
- ☐ Other, specify _____

Type of Business

- ☐ Hospital
- ☐ Skilled Nursing Facility
- ☐ DME/HME
- ☐ Home Health Agency
- ☐ Educational Institution
- ☐ Manufacturer or supplier
- ☐ Other, specify _____

Date of Birth (optional) _____ Sex (optional) _____

U.S. Citizen? ____ Yes ____ No

Have you ever been a member of the AARC? _____

If so, when? From _____ to _____

Preferred mailing address: ☐ Home ☐ Business

For office use only

FOR ACTIVE MEMBER

An individual is eligible if he/she lives in the U.S. or its territories or was an Active Member prior to moving outside its borders or territories, and meets ONE of the following criteria: (1) is legally credentialed as a respiratory care professional if employed in a state that mandates such, OR (2) is a graduate of an accredited educational program in respiratory care, OR (3) holds a credential issued by the NBRC. An individual who is an AARC Active Member in good standing on December 8, 1994, will continue as such provided his/her membership remains in good standing

PLEASE USE THE ADDRESS OF THE LOCATION WHERE YOU PERFORM YOUR JOB, NOT THE CORPORATE HEADQUARTERS IF IT IS LOCATED ELSEWHERE

Place of Employment _____

Address _____

City _____

State _____ Zip __ __ __ __ __-__ __ __ __

Phone No. (_____) _____

Medical Director/Medical Sponsor _____

FOR ASSOCIATE OR SPECIAL MEMBER

Individuals who hold a position related to respiratory care but do not meet the requirements of Active Member shall be Associate Members. They have all the rights and benefits of the Association except to hold office, vote, or serve as chair of a standing committee. The following subclasses of Associate Membership are available: Foreign, Physician, and Industrial (individuals whose primary occupation is directly or indirectly devoted to the manufacture, sale, or distribution of respiratory care equipment or supplies). Special Members are those not working in a respiratory care-related field.

PLEASE USE THE ADDRESS OF THE LOCATION WHERE YOU PERFORM YOUR JOB, NOT THE CORPORATE HEADQUARTERS IF IT IS LOCATED ELSEWHERE.

Place of Employment _____

Address _____

City _____

State _____ Zip __ __ __ __ __-__ __ __ __

Phone No. (_____) _____

FOR STUDENT MEMBER

Individuals will be classified as Student Members if they meet all the requirements for Associate Membership and are enrolled in an educational program in respiratory care accredited by, or in the process of seeking accreditation from, an AARC-recognized agency

SPECIAL NOTICE — Student Members do not receive Continuing Respiratory Care Education (CRCE) transcripts. Upon completion of your respiratory care education, continuing education credits may be pursued upon your reclassification to Active or Associate Member.

School/RC Program _____

Address _____

City _____

State _____ Zip __ __ __ __ __-__ __ __ __

Phone No. (_____) _____

Length of program

- ☐ 1 year
- ☐ 2 years
- ☐ 4 years
- ☐ Other, specify _____

Expected Date of Graduation (REQUIRED INFORMATION)

Month _____ Year _____

American Association for Respiratory Care Membership Application

Demographic Questions

We request that you answer these questions in order to help us design services and programs to meet your needs.

Check the Highest Degree Earned

- ☐ High School
- ☐ RC Graduate Technician
- ☐ Associate Degree
- ☐ Bachelor's Degree
- ☐ Master's Degree
- ☐ Doctorate Degree

Number of Years in Respiratory Care

- ☐ 0-2 years
- ☐ 3-5 years
- ☐ 6-10 years
- ☐ 11-15 Years
- ☐ 16 years or more

Job Status

- ☐ Full Time
- ☐ Part Time

Credentials

- ☐ RRT
- ☐ CRTT
- ☐ Physician
- ☐ CRNA
- ☐ RN
- ☐ LVN/LPN
- ☐ CPFT
- ☐ RPFT
- ☐ Perinatal/Pediatric

Salary

- ☐ Less than $10,000
- ☐ $10,001-$20,000
- ☐ $20,001-$30,000
- ☐ $30,001-$40,000
- ☐ $40,000 or more

PLEASE SIGN

I hereby apply for membership in the American Association for Respiratory Care and have enclosed my dues. If approved for membership in the AARC, I will abide by its bylaws and professional code of ethics. I authorize investigation of all statements contained herein and understand that misrepresentations or omissions of facts called for is cause for rejection or expulsion.

A yearly subscription to RESPIRATORY CARE journal and *AARC Times* magazine includes an allocation of $6.50 from my dues for each of these publications.

NOTE: Contributions or gifts to the AARC are not tax deductible as charitable contributions for income tax purposes. However, they may be tax deductible as ordinary and necessary business expenses subject to restrictions imposed as a result of association lobbying activities. The AARC estimates that the nondeductible portion of your dues — the portion which is allocable to lobbying — is 26%.

Signature _____

Date _____

Membership Fees

Payment must accompany your application to the AARC. Fees are for 12 months. (NOTE: Renewal fees are $65.00 Active, Associate-Industrial or Associate-Physician, or Special status; $80.00 for Associate-Foreign status; and $35.00 for Student status).

☐ Active	$77.50
☐ Associate (Industrial or Physician)	$77.50
☐ Associate (Foreign)	$92.50
☐ Special	$77.50
☐ Student	$35.00
TOTAL	$_____

Specialty Sections

Established to recognize the specialty areas of respiratory care, these sections publish a newsletter four times a year that focuses on issues of specific concern to that specialty. The sections also design the specialty programming at the national AARC meetings.

☐ Adult Acute Care Section	$5.00
☐ Education Section	$10.00
☐ Perinatal-Pediatric Section	$5.00
☐ Diagnostics Section	$5.00
☐ Continuing Care-Rehabilitation Section	$5.00
☐ Management Section	$10.00
☐ Transport Section	$5.00
☐ Home Care Section	$5.00
☐ Subacute Care Section	$5.00
TOTAL	$_____

GRAND TOTAL = Membership Fee plus optional sections $_____

- ☐ Total Amount Enclosed $_____
- ☐ Please charge my dues (see below)

To charge your dues, complete the following:

- ☐ MasterCard
- ☐ Visa

Card Number

— — — — — — — — — — — — — — — —

Card Expires _____/_____

Signature _____

Mail application and appropriate fees to:
American Association for Respiratory Care • 11030 Ables Lane • Dallas, TX 75229-4593 • (972) 243-2272 • Fax (972) 484-2720

Health Evaluation or APACHE III score) for their abilities to predict the outcomes of in-hospital cardiopulmonary resuscitation (CPR). The medical records of all 656 adult inpatients undergoing CPR during a 2-to-3-year period in 3 large hospitals were retrospectively reviewed, and demographic and clinical variables were abstracted. Of 656 patients undergoing resuscitation, 248 (37.8%) survived the resuscitation attempt long enough to be stabilized (immediate survival), but only 35 (5.3%) survived to discharge. Only 11 patients had PAM scores higher than 8, none of whom survived to discharge; 131 patients had PAR scores above 8, of whom 6 survived to discharge. The PAR score and the APACHE III score had the greatest areas under the receiver operating characteristic curves (when predicting the outcome of survival to discharge), although no individual area for either outcome was greater than 0.6. None of the decision-support tools studied was able to effectively discriminate between survivors and non-survivors for the outcomes of immediate survival and survival to discharge following in-hospital CPR. This is consistent with previous work utilizing the APACHE II score, which did not identify a threshold above which patients did not benefit from CPR. The findings for the PAR score and the PAM score stand in contrast to previous studies that found them to be potentially useful decision rules. Further work is needed to develop a decision-support tool that better discriminates between survivors and non-survivors of in-hospital CPR.

Environmental Tobacco Smoke: A Hazard to Children (Statement)— American Academy of Pediatrics, Committee on Environmental Health. Pediatrics 1997;99(4):639.

Results of epidemiologic studies provide strong evidence that exposure of children to environmental tobacco smoke is associated with increased rates of lower respiratory illness and increased rates of middle ear effusion, asthma, and sudden infant death syndrome. Exposure during childhood may also be associated with development of cancer during adulthood. This statement reviews the health effects of environmental tobacco smoke on children and offers pediatricians a strategy for promoting a smoke-free environment.

Decreasing Smoking Prevalence during Pregnancy in Sweden: The Effect on Small-for-Gestational-Age Births—S Cnattingius, Bengt Haglund. Am J PublicHealth 1997;87(3):410.

OBJECTIVE: This study examined whether recent changes in smoking prevalence among pregnant women have affected risks of small-for-gestational-age births. METHODS: With data for all live single births in Sweden from 1983 through 1992 (n = 1,048,139), odds ratios [ORs] and attributable risks of small-for-gestational-age births were calculated for 1983 through 1985, 1986 through 1989, and 1990 through 1992. RESULTS: Daily smoking decreased from 29.4% in 1983 to 21.8% in 1992. For the 3 time periods, the ORs of small-for-gestational-age births by maternal smoking were almost identical: 1-9 cigarettes/day OR = 2.1 or 2.2; for ≥ 10 cigarettes/day, OR = 2.8. The attributable risk of smoking for small-for-gestational-age births declined from 26.2% in 1983 through 1985 to 20.9% in 1990 through 1992. CONCLUSIONS: The findings point to a true decrease in tobacco exposure during pregnancy and a reduction in the attributable risk for small-for-gestational-age births.

Effects of Obesity and Fat Distribution on Ventilatory Function: The Normative Aging Study—R Lazarus, D Sparrow, ST Weiss. Chest 1997; 111(4):891.

OBJECTIVE: Although the influence of obesity on ventilatory function has long been recognized, the nature of the relationship and the mechanisms are not yet clear. The purpose of this report was to examine the effects of overall obesity and fat distribution on ventilatory function. METHODS: Multiple measurements over > 30 years from 507 subjects with lifelong tobacco consumption of ≤ 1 pack-year were analyzed separately in 5 age decades from 30 to 79 years. FVC, FEV_1, ratio of FEV_1 to FVC, and maximal midexpiratory flow rate (MMEF) were each adjusted for age and stature. Relative adiposity (or obesity) was assessed using the body mass index (BMI). Subscapular skinfold thickness, abdominal girth, and the ratio of abdominal girth to hip breadth (AG/HB) were used as measures of body fat distribution. Multiple linear regression was used to explore the effects of overall adiposity and body fat distribution on ventilatory function. RESULTS: BMI was positively associated with the ratio of FEV_1 to FVC at all ages ($p < 0.01$), and negatively with FVC and MMEF between 40 and 69 years ($p < 0.01$). After adjustment for BMI, subscapular skinfold thickness was negatively associated with both FVC and FEV_1 ($p \leq 0.02$) among men aged 30 to 59 years, whereas AG/HB was negatively associated with FVC and FEV_1 in men aged 50 to 59 years only ($p \leq 0.0004$). CONCLUSIONS: Body fat distribution has independent effects on ventilatory function after adjustment for overall obesity in men. The finding that age modifies this association has implications for future research. *See the related editorial:* ***Obesity and Pulmonary Function: More or Less?*** *DY Sue. Chest 1997;111(4): 844-845.*

Interest of a Therapeutic Optimization Strategy in Severe ARDS—N Guinard, S Beloucif, C Gatecel, J Mateo, D Payen. Chest 1997;111 (4):1000.

OBJECTIVE: Evaluate the interest of the response to a therapeutic optimization as a predictor of prognosis in ARDS. DESIGN: Prospective study. SETTING: ICU of a University Hospital. PATIENTS: Thirty-six consecutive patients with severe ARDS addressed for extracorporeal carbon dioxide removal ($ECCO_2R$). INTERVENTIONS: We studied the response during the first 2 days after arrival to the therapeutic optimization strategy consisting in a combination of the following: (1) decrease in extravascular lung water (diuretics or hemofiltration); (2) selection of the best ventilatory mode; (3) permissive hypercarbia; and (4) correction of hypoxemia by alveolar recruitment, additional continuous oxygen insufflation, body position changes (prone position), inhaled nitric oxide, enhancement of hypoxic pulmonary vasoconstriction with almitrine, and drainage of pleural or mediastinal effusions. In patients remaining severely hypoxemic despite these modalities, $ECCO_2R$ was then proposed. MEASUREMENTS & RESULTS: Thirty-six patients were addressed after 8.3 ± 5.5 days of mechanical ventilation. On arrival, mean simplified acute physiologic score was 46.8 ± 14.2, multiple system organ failure

With the Reader Service Reply Card, You Can Stop Searching and Start Buying.

Get the facts on all the products and services advertised in this issue easily and quickly. The computerized Reader Service Reply Card does it all. Simply fill in your name and address, check the appropriate boxes, and mail or fax it to the location indicated on the card.

score was 1.8 ± 1.6, Murray score was 3.4 ± 0.4, P_{aO_2} was 75.3 ± 31.3 (fraction of inspired oxygen [F_{IO_2}] = 1) for a positive end-expiratory pressure level of 12.3 ± 3.4 cm H_2O. Nineteen of 36 patients improved their gas exchange within 2 days and their mortality was 21%. The 17 remaining patients did not improve P_{aO_2}/F_{IO_2}; P_{aCO_2} and airway pressures remained high and their mortality was 88%. This different response to therapeutic optimization appeared using stepwise logistic regression as the most predictive factor for mortality ($p < 0.05$). CONCLUSIONS: In patients with severe ARDS, the response to an early performed therapeutic optimization used to improve hypoxemia appeared to be a highly discriminant factor distinguishing deceased from surviving patients. *See the related editorial:* ***Rescue Therapy for the Acute Respiratory Distress Syndrome (ARDS)*** *MH Kollef. Chest 1997;111(4):845-846.*

Airways Remodeling Is a Distinctive Feature of Asthma and Is Related to Severity of Disease—A Chetta, A Foresi, M Del Donno, G Bertorelli, A Pesci, D Olivieri. Chest 1997;111(4):852.

PURPOSE: Airways remodeling, evaluated as the subepithelial layer thickness, was compared in asthmatic patients with that of healthy subjects, and was related to clinical grading of disease, presence of atopy, and length of asthmatic history. SUBJECTS & METHODS: Thirty-four patients with stable asthma (mean age ± SD: 26.5 ± 9.2 years; 10 female) treated with only inhaled β_2-agonists and 8 healthy volunteers (mean age ± SD: 24.6 ± 2.5 years; 4 female) were recruited for the study. Twenty-seven of 34 asthmatics had atopy. Eleven patients had newly diagnosed conditions (duration of disease ≤ 1 year), 9 patients had long asthmatic history (> 1 year and ≤ 10 years), and 14 had prolonged asthmatic history (> 10 years). Bronchial responsiveness to methacholine (M) was expressed as provocative concentration of M causing a 20% fall in FEV_1 (PC_{20}) (mg/mL). Degree of asthma severity was assessed using a 0- to 12-point score based on symptoms, bronchodilator use, and daily peak expiratory flow variability over a 3-week period. Bronchoscopy and bronchial biopsy were performed successfully for all subjects; the subepithelial layer thickness, in biopsy samples, was measured from the base of bronchial epithelium to the outer limit of reticular lamina. RESULTS: In asthmatics, baseline FEV_1 values (percent of predicted) ranged from 75.7 to 137.0%, and PC_{20} M ranged from 0.15 to 14.4 mg/mL. According to the asthma severity score, 14 asthmatics were classified as having mild disease, 14 as having moderate disease, and 6 as having severe disease. The mean values of subepithelial layer thickness were 12.4 ± 3.3 μm (range, 6.8 to 22.1 μm) in asthmatics, and 4.4 ± 0.5 μm (range, 3.8 to 5.2 μm) in healthy subjects ($p < 0.001$). Subepithelial layer thickness of those with severe asthma differed significantly from that of patients with moderate and mild asthma (16.7 ± 3.1 μm vs 12.1 ± 2.7 μm and 10.8 ± 2.4 μm, $p < 0.01$ and $p < 0.003$, respectively). Moreover, in asthmatics, degree of thickening was positively correlated to asthma severity score (Spearman rank correlation coefficient [rs] = 0.581; $p < 0.001$), and negatively correlated with baseline FEV_1 ($rs = -0.553$; $p < 0.001$) and PC_{20} M ($rs = -0.510$; $p < 0.01$). No difference was found between degree of thickening observed in atopic asthmatics, compared with that of nonatopic asthmatics, or between degree of thickening in patients with different lengths of asthmatic history. Lastly, multiple regression analysis revealed that asthma severity score was the significant predictive factor for thickness of subepithelial layer. CONCLUSIONS: We confirmed that airways remodeling is a very distinctive and characteristic pathologic finding of asthma. We also demonstrated that it is related to the clinical and functional severity of asthma, but not to atopy or length of asthmatic history.

Quality Control of Spirometry Testing in the Registry for Patients with Severe α_1-Antitrypsin Deficiency—JK Stoller, AS Buist, B Burrows, RG Crystal, RJ Fallat, K McCarthy, et al, and the α_1-Antitrypsin Deficiency Registry Study Group. Chest 1997;111(4):899.

As part of the multicenter National Heart, Lung, and Blood Institute registry of patients with severe deficiency of α_1-antitrypsin with 1,129 enrollees, this report describes measures undertaken to achieve high-quality FEV_1 measurements, the rates of satisfying reproducibility and acceptability criteria, and clinical features of participants unable to achieve reproducible FEV_1 values at baseline. Spirograms were performed both before and after an inhaled bronchodilator in enrollees followed up at 37 participating clinical centers. Using a reproducibility criterion of < 100 mL or 5% (whichever greater), high reproducibility rates for FEV_1 measurements at baseline were observed for both prebronchodilator (95.0% of 1,090 sessions) and postbronchodilator measurements (95.7% of 1,077 sessions). Using the more recently published reproducibility criterion of ≤ 200 mL, reproducibility rates were even higher. Eighty-four percent of clinical centers submitted FEV_1 values that satisfied reproducibility criteria for at least 90% of spirograms. Also, the mean coefficient of variation for prebronchodilator FEV_1 values measured over serial visits separated by up to 9 months was 5.6% for participants with baseline FEV_1 55 to 90% predicted. This degree of reproducibility is similar to that observed in the Lung Health Study. Rates of satisfying acceptability criteria for prebronchodilator spirograms were lower, almost universally (98% of tests) due to failure to achieve end-of-test criteria (which usually required 15 s of expiration in this population with mean FEV_1 = 42.6 ± 29.6% [SD] predicted). Multivariate logistic regression models show that clinical correlates of failure to achieve reproducible prebronchodilator FEV_1 efforts include symptoms of chronic wheeze, chronic cough, and chronic phlegm, and the degree of airflow obstruction. We conclude that highly reproducible FEV_1 measurements are achievable in a population with severe airflow obstruction despite the additional challenges posed by testing in multiple centers on a variety of spirometers. Furthermore, the difficulty of satisfying end-of-test criteria in a large cohort with severe airflow obstruction did not preclude achieving high rates of reproducibility for FEV_1 measurements. Finally, our study confirms prior observations that failure to achieve reproducible efforts is associated with the presence of pulmonary symptoms and the degree of airflow obstruction. Thus, excluding patients with nonreproducible FEV_1 efforts from epidemiologic studies would bias results by including only healthier participants.

Pregnancy and Cystic Fibrosis: A Case-Controlled Study—DD Frangolias, EM Nakielna, PG Wilcox. Chest 1997;111(4):963.

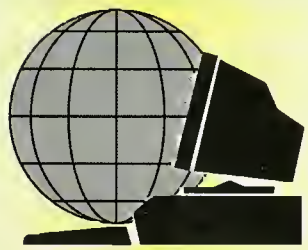
OBJECTIVES: Changes in cardiorespiratory and pulmonary function that occur with normal pregnancy along with increased maternal and fetal demands related to cystic fibrosis (CF) may augment morbidity for the woman with CF. Status prior to pregnancy is implicated in pregnancy outcome and maternal life expectancy postpartum. The purpose of this study was to investigate the effect of pregnancy on these patients' course during pregnancy and document prepregnancy status and 2-year postpregnancy survival. DESIGN: Patients with documented pregnancies were matched to nonpregnant CF patients of similar age (± 2 years), severity of airflow obstruction (percent predicted forced expiratory volume in 1 min [± 15%]), weight (± 10 kg), height (± 5 cm), and pancreatic sufficiency status at 1 year preconception. PATIENTS: Using their 1-year preconception data, 7 women with CF and with documented pregnancies were matched to nonpregnant control subjects. All patients were pancreatic insufficient. INTERVENTIONS: Weight, forced expiratory volume in 1 minute (% FEV_1), FVC, Schwachman-Kulczycki (S-K) and Brasfield scores, sputum cultures, pregnancy outcome, and pulmonary exacerbations were followed from 1-year preconception, during pregnancy, and 2-years postpregnancy. MEASUREMENTS & RESULTS: Mean weight gain during pregnancy was 5.2 kg. There were no differences between the groups in the rate of decline for pulmonary function or S-K scores over time. Greater rate of decline was noted in the pregnancy group, however, for body weight and Brasfield scores in the postpartum interval. One patient in the pregnancy group died 6 months postpartum. CONCLUSIONS: Pregnancy has little adverse effect on patients with stable CF, but poor outcomes can occur in individuals with more advanced disease.

You need it now—not next month, not next week.

Now!

And you can have it!

The fastest answers to your questions about products and services advertised in the current issue of RESPIRATORY CARE are just a "Click" away when you go online:



http://www.aarc.org/resources/html

AARC Online

CLINICAL PRACTICE GUIDELINES **http://www.aarc.org**

Do you want access to all of the AARC's Clinical Practice Guidelines? Find them on our website at www.aarc.org

STATE PRACTICE ACTS **http://www.aarc.org**

Check to see if your state practice act is online at www.aarc.org

RESPIRATORY CARE NEWS **http://www.aarc.org**

Get your news as it happens in the Members Only area of AARC Online at www.aarc.org

EMPLOYMENT OPPORTUNITIES **http://www.aarc.org**

Read the latest employment opportunities as soon as they are submitted to the AARC at www.aarc.org

STATEMENT OF ETHICS AND PROFESSIONAL CONDUCT **http://www.aarc.org**

Access this and all other AARC position statements at www.aarc.org

Are You Connected?
MEMBERS ONLY AREA **http://www.aarc.org**

As an AARC member you can access information for members only on AARC Online. Sign on and follow the directions at www.aarc.org

Albert Einstein College of Medicine • American Academy of Pain Management • American Association of Diabetes Educators • American Institute for Preventive Medicine • American Medical Women's Association, Inc. • AV Medical Health Plan • Beth Israel Deaconess Medical Center • Blue Cross Blue Shield of CT • Blue Cross Blue Shield of MA • Blue Cross Blue Shield of MI • Blue Cross Blue Shield of NH • Bronx Hospital Center • CCF Health Care Venture, Inc. • CIGNA HealthCare of Northern New Jersey • CIGNA HealthCare of Southern CA • Columbia-Good Samaritan Health System • Columbia Network Management Services • Columbia University Medical School • Control Diabetes Services • Covance-Health Economics and Outcomes Study, Inc. • Curative Health Services • Diabetes Treatment Centers of America • Duke University School of Medicine • Elderplan • Express Scripts • Firstcare • Good Samaritan Hospital • Greenwich Healthcare Consulting • Group Health Cooperative of Puget Sound • Harlem Hospital Center • Harvard Community Health Plan • Harvard Medical School • Harvard Pilgrim Health Care • Hastings Healthcare Group • Health Care Consulting Associates • Integrated Health Sa... Diabetes Center • John... & Company • Lahey H... Matters Health System... Center Hospital • North Medical Center • North Mississippi Medical Center • Northwest Covenant Medical Center • Northwestern University Medical School • Oxford Health Plan • Painewebber, Inc. • PamNatal Care of America • PCS Health Systems, Inc. • PHP Healthcare Corporation • Physician Disease Management, Inc • Preferred Health Systems, LLC • Procter & Gamble Company • Research Medical Center/Health Midwest • Rush Primary Care Institute • ScrippsHealth Performance Improvement • St. Joseph's Mercy-Macomb • St. Louis University School of Medicine • St. Luke's Roosevelt Hospital • St. Paul-Ramsey Medical Center • Stanford University School of Medicine • Texas A & M Health Science Center • The Boeing Company • The Center for Case Management • The College of Physicians • The Lancet • The MEDSTAT Group • University of Miami School of Medicine • University of North Carolina at Chapel Hill • University of Pennsylvania School of Medicine • University of Utah School of Medicine • Wausau Insurance Company • Waynesboro Hospital • Wellness Councils of America • William M. Mercer, Inc. • Abbott Labs • Accordant Health Services • Advocate Health Care • Allina Health System • American College of Rheumatology • American Oncology Resources • AFC, Inc. • Barnes Jewish West County Hospital • Baxter Renal Division • Blue Cross Blue Shield CA • Blue Cross Blue Shield FL • Blue Cross Blue Shield MI • Blue Cross Blue Shield TX • Boehringer Ingelheim • Care Oregon • CareAmerica Health Plan • CCF Health Care Ventures • Centers for Disease Control & Prevention • Center for Clinical AIDS Research & Education • Chiron Corporation • City of Hope National Medical Center • CNA Insurance • Columbia Concord Medical Center • Control Diabetes Services • Cost Care Inc. • Dartmouth-Hitchcock Medical Center • Dean Medical Center • Detroit Medical Center • Diabetes Treatment Centers of America • EDS • Enloe Outpatient Center • Fred Hutchinson Cancer Research Center • Genesis Healthcare Inc. • Good Samaritan Hospital • Greenstone Health Care Solutions • Group Health Cooperative of Puget Sound • Harvard Pilgrim Health Care • Health Benefits America • Health Cost Consultants • Health Net • Heritage Medical Systems • Home Health Care of WA • Inova Health System • International Association of Physicians in AIDS Care • Kaiser Permanente • Kelsey-Seybold Clinic • Learning Services • Legacy Health System • Lovelace Health Systems • Mayo Clinic • McGraw • Medi-Cal Operations Division • Memorial Hospital • Mercy Medical Foundation • Mylan Laboratories • North Health Plan • NYLCare Health Plans Inc. • PacifiCare of California • Park Nicollet Clinic • PCA Health Plans of TX • Planned Parenthood • PrideCare • Principal Healthcare, Inc. • Portland Cardiovascular Institute • Quadchoice Health Plan • Research Triangle Institute • Reynolds & Reynolds • Sachs Group • Salick Health Care, Inc. • Sara Lee Corporation • SB Visiting Nurse Association • SDMS • Sloans Lake Managed Care • Southern California Edison • St. Jude Medical Center • St. Vincents Medical Center • State of CA - Health Service • Suburban Ostomy • Talbert Medical Management Corporation • Tenneco • The Johns Hopkins University School of Medicine • The New York Hospital • Tomball Regional Hospital • Trigon Blue Cross Blue Shield • U.C. Medical Center • UMDNJ-New Jersey Medical School • University Hospital Consortium • University of Michigan Medical Center • University of MO Hospital •

BE THERE.

Join more than 3500 companies who know where to get clear, concise information on disease management in 1997. Learn how to build an infrastructure to maximize outcomes along the care continuum for Diabetes, Asthma, Cardiology and HIV/AIDS.

The Second Annual
DISEASE MANAGEMENT CONGRESS

BUILDING AN INFRASTRUCTURE *for* TOTAL HEALTH MANAGEMENT

September 2-5, 1997 • Sheraton Washington Hotel • Washington, DC

Produced by
The National Managed Health Care Congress
NMHCC

Yes! I would like to hear vital information and ideas regarding the progress being made on disease management. Please send me detailed information about The Second Annual Disease Management Congress. ADCA1 AYZA1 AYDA1 AYZPA1 AYXA1

Name: _____

Title: _____

Company: _____

Address: _____

City, State, Zip: _____

E-mail: _____

Fax this coupon to (617) 663-6400; Mail this coupon to: 71 Second Ave., 3rd Floor, Waltham, MA 02154; Call toll-free: 888-44-NMHCC (888-446-6422); or e-mail register@nmhcc.com for more information

Circle 132 on reader service card

596.97

Avoiding the 'Tower of Babel' in RESPIRATORY CARE

Every day, RESPIRATORY CARE receives manuscripts from authors who, of course, would like their work to be published. Rarely, if ever, does a manuscript proceed directly to be printed as it was received and reviewed. At the least, some minor polishing must be done; at worst, the piece may be rejected. Before being returned to the author(s) for revision, the paper is read by an editor and then is usually sent to at least 3 content, experts-in-their-field reviewers for their comments and suggestions. These reviewers can be located any where in the United States and, perhaps, elsewhere in the world. To facilitate this review process and also make the article useful to the most readers, the language, terminology, and symbols must conform to certain conventions. Local colloquialisms, jargon, and regional slang serve only to confuse the issue and hinder the dissemination of the article's message.

Part of the problem lies in our culture, in which individuality is cherished and encouraged. Additionally, we are also one of only two countries (unless Burma has changed since 1988) that persists in and insists on using the English system of units as our official system of measurement. Of course, for the United States to compete on the world market, any manufactured goods must conform to metric specifications. And, metric units are those used in medicine. We are, thus, somewhat 'schizophrenic' when it comes to symbols and units.

This schizophrenia does not serve us well if it complicates the dissemination of information. The respiratory care community first addressed the issue of confusing terminology in a pair of editorials nearly a quarter of a century ago.[1,2] Since then, several attempts have been made to encourage the use of a common set of terms, units, and symbols. Probably the first major attempt at standardization of the language of pulmonary medicine was the publication of the report of the American College of Chest Physicians-American Thoracic Society (ACCP-ATS) Joint Committee on Pulmonary Nomenclature in 1975 in Chest.[3] In 1988, Chatburn[4] published a fairly complete description of the Système International, the successor to the metric system. (An adaptation of the ACCP-ATS Committee's recommendations on symbols and terms can be found in the Guidelines, Statements, & Recommendations Section of this Issue of RESPIRATORY CARE. In addition, two tables from Chatburn's 1988 article are reproduced.) To further clarify terminology, particularly related to mechanical ventilation, Chatburn has published an article defining a system for understanding ventilators[5] and the article, "Classification of Mechanical Ventilators."[6] The topic was elaborated on by Branson and Chatburn[6] in an article further illustrating and classifying modes of ventilator operation.[7] As an instructor, I have found all of these documents to be useful to investigators, students, and readers. My experience as a respiratory therapist prompted me to address this topic in December of last year in an editorial to RESPIRATORY CARE describing the current state of affairs regarding the standardization of terms and symbols.[8] The fact is debate continues over what constitutes the appropriate word or symbol in respiratory care, even when it seems the issue should be settled.

So where are we going with all this? If you are planning to submit a manuscript or article to RESPIRATORY CARE for publication, I recommend that you do some homework first. Investigation will save much time, gnashing of teeth, and uttering of expletives later on. First, read the Manuscript Preparation Guide, which is published nearly every month in the Journal. Next, and probably equally important, read both the ACCP-ATS recommendations and Chatburn's articles, and Branson and Chatburn's work (the citations are in the Reference list following this editorial). Talk with a colleague who has already had something published (a mentor, in the latest terminology). If you have questions after your perusal of the literature or your discussions with others, call, Pat Brougher, the Journal's editor, or Kris Williams, Assistant Editor, at the Editorial Office—they are always willing to help a potential author.

Everyone has his own preferences and prejudices based on what he has learned, from whom he learned it, and his own experiences using what he has learned. What we need is for everyone simply to agree on a common set of words, symbols, and abbreviations. We all may be speaking "scientificese" but the different dialects are an ongoing problem. Just as English is the common language for air traffic control, there should be a single language used by people who write and read about the pulmonary system. Let the editorial board know if you think this is a priority for a Journal conference. You can contact James Stoller MD, Chairman of the Editorial Board, through the Journal office.

Robert R Fluck Jr MS RRT
Associate Professor
SUNY-Health Science Center
Syracuse, New York

REFERENCES

1. Petty TJ. Alphabet soup (editorial). Respir Care 1973;18(1):10, 14.
2. Kittredge P. Guise and dolls (editorial). Respir Care 1973;18(1):14, 16.
3. American College of Chest Physicians, American Thoracic Society. A report of the ACCP-ATS Joint Committee on Pulmonary Nomenclature. Chest 1975;67(5):581-593.
4. Chatburn RL. Measurement, physical quantities, and le Système Internationale d'Unités (SI). Respir Care 1988;33(10):861-873.
5. Chatburn RL. Classification of mechanical ventilators. Respir Care 1992;37(9):1009-1025.
6. Chatburn RL. A new system for understanding mechanical ventilators. Respir Care 1991;36:1123-1155.
7. Branson RD, Chatburn RL. Technical description and classification of modes of ventilator operation. Respir Care 1992;37(9):1026-1044.
8. Fluck RR. What is the name of this treatment (disease, abbreviation) anyway? A call for terminology standardization (editorial). Respir 1996;41(12):1077-1081.

Reprints & Correspondence: Robert R Fluck Jr MS RRT, Clinical Coordinator, Dept of Cardiorespiratory Sciences, 0213 Silverman Hall, SUNY Health Science Center, 750 E Adams, Syracuse NY 13210. e-mail: fluckr@vax.cs.hscsyr.edu.

The Manuscript Preparation Guide: Revisited and Revised

Introduction

> When we asked Pooh what the opposite of an Introduction was he said "The what of a what?" which didn't help us as much as we had hoped, but luckily Owl kept his head and told us that the Opposite of an Introduction, my dear Pooh, was a Contradiction; and as he is very good at long words, I am sure that that's what it is.
> —AA Milne, *The House at Pooh Corner*

This month's RESPIRATORY CARE is replete with information to assist respiratory care researchers with the task of reporting and publishing their findings. Reprinted herein are the *Uniform Requirements for Manuscripts Submitted to Biomedical Journals*,[1] the *World Medical Association Declaration of Helsinki*,[2] a revised RESPIRATORY CARE Manuscript Preparation Guide,[3] and a listing of the most commonly used abbreviations and symbols for the respiratory care literature with an accompanying editorial by Robert R Fluck Jr.[4]

It is necessary to reprint these documents and to revise our Manuscript Preparation Guide to reference the *Uniform Requirements* and the *Declaration of Helsinki* because, we believe, it is important to maintain our reputation as the premier Journal for respiratory care professionals and to adhere to the fundamentals that affirm the Journal's status as a reputable science journal.

SEE THE GUIDELINES, RECOMMENDATIONS, & STATEMENTS SECTION ON PAGES 623-646.

A recent report in *JAMA*[5] concluded that only half of 102 biomedical research journals (English-language publications) listed in the 1995 *Abridged Index Medicus* publish guidelines directing authors to indicate whether institutional review board approval had been obtained and that the manner in which these standards are presented is extremely variable. The report also stated that only 15% of the journals referred authors to the *Uniform Requirements for Manuscripts Submitted to Biomedical Journals*, 3% referred authors to the *Declaration of Helsinki*, and 10% indicated that informed consent should be obtained. We believe that adding these references to our Manuscript Preparation Guide is important.

Ethics & The Declaration of Helsinki

> "Well," said Owl, "the customary procedure in such cases is as follows."
> "What does Crustimoney Proseedcake mean?" said Pooh ...
> "It means the Thing to Do."
> "As long as it means that, I don't mind," said Pooh humbly.
> —AA Milne, *Winnie-the-Pooh*

Research ethics relate to more than just the reporting of studies. Research ethics begin with the principles that govern investigator conduct during the research design, implementation, and data analysis and extend to the reporting of the data.[6] Craig[7] defines the three principles of ethics that should be most relevant to clinical researchers: respect for others, justice, and beneficence. In other words, the thing to do.

Over the years, examples of research misconduct or unethical behavior have been recorded in prominent journals. For instance, we have seen the reports: Willowbrook School for the Retarded residents purposely infected with hepatitis;[8] in a New York City hospital, unconsenting elderly patients injected with cancer cells;[9] and, in the Tuskegee study[10] of the long-term effects of syphilis, treatment deliberately withheld from a group of black patients. Most of us would call this blatant misconduct, but some of this research was carried out by prominent scientists.

Most of our current view of research ethics evolved after World War II as a result of Nazi war crimes in which Jews and others were used as unwilling participants in many medical research projects.[11] The first code, the Nuremberg Code of 1947,[12] was developed to prevent further atrocities. Later, during the World Medical Association's 18th Assembly in 1964, the Declaration of Helsinki[2] was written. Subsequent revisions have given us the document we reference today.

It has been our experience that many institutions rely on the Declaration of Helsinki as a code of conduct, including the U.S. Food and Drug Administration, and include these standards in their internal review boards or committees on human experimentation guidelines. It makes sense, therefore,

that if these standards are followed, then they should be recorded in the manuscript.

The RESPIRATORY CARE Manuscript Preparation Guide currently includes a request that authors indicate whether procedures were conducted in accordance with the ethical standards of the institution's committee on human experimentation and to state whether informed consent was obtained. In addition, the Guide suggests that researchers record that experiments on animals were conducted in accordance with the institution's policy, a national guideline, or law on the care and use of laboratory animals. Conflicts of interest are also covered.

The revised edition of the Manuscript Preparation Guide will continue to include these standards. However, the Declaration of Helsinki will now be referenced—a step that takes us beyond most of the journals in *Index Medicus*.[5]

Crossing "T"s and Dotting "I"s—Uniform Requirements

Although RESPIRATORY CARE's current Manuscript Preparation Guide does not refer to the *Uniform Requirements for Manuscripts Submitted to Medical Journals*,[1] the omission is remedied in this updated Guide.

Why would the editorial staff wish to make this change in our guidelines? The need for respiratory care practitioners to learn more about their profession is a global need. In this Issue, a report from Canada[13] is shared, and in the past months reports from Slovenia[14] and The Netherlands[15] (in conjunction with a hospital in San Diego CA) have been included. The Journal is gaining worldwide attention, and it is because of this that we now consider for publication papers that are written using the *Uniform Requirements*.

The development of this document was from its origin an international process to establish guidelines for the format of manuscripts. Today, the international group consists of journal editors from Great Britain, Canada, Australia, Norway, the United States, and New Zealand.[1] Because of the international interest in RESPIRATORY CARE and because this document was developed by such a broad group of internationals, its inclusion in our Manuscript Preparation Guide is a logical progression, in our opinion.

Bishop[16] said that the entire purpose of instructions to authors is to speed the process by telling authors how to prepare manuscripts in a form that requires the minimum of revision before printing. Furthermore, it has been our experience that authors who follow the Manuscript Preparation Guide when they prepare to submit documents to the editorial office find publication easier. The Guide explains how to develop a paper in a step-by-step manner and provides a checklist of appropriate inclusions. In addition, the Guide is printed nearly every month so it is handy for authors. Reviewers use the Guide to analyze manuscripts during the peer-review process—and uniformity helps them save time, speeding a manuscript to the press. The checking of references is also made easier by uniformity; the simple manner in which a journal article is cited compared to a book citation allows a copy-editor or proofreader to know where to look for verification. This month's editorial by Fluck[4] points out the necessity of using uniform abbreviations and symbols to enhance clarity and avoid confusion.

The 'bottom line'—use these documents!

In Conclusion

> But owl went on and on, using longer and longer words, until at last he came back to where he started...
> —AA Milne, *Winnie-the-Pooh*

We are back to where we began. Editors and copyeditors should review their author guides from time to time as changes and deficiencies are noted.[16] We have done that, and we submit that authors (and readers) should also review them from time to time. The RESPIRATORY CARE Manuscript Preparation Guide is printed on pages 643-646 in this Issue, and, we hope, it will become a vital resource to authors—published and unpublished.

Kris Williams BA
Assistant Editor
RESPIRATORY CARE
Dallas, Texas

Dean R Hess PhD RRT
Board Member
RESPIRATORY CARE Editorial Board

Assistant Professor of Anesthesia
Harvard Medical School
Assistant Director of Respiratory Care
Massachusetts General Hospital
Boston, Massachusetts

REFERENCES

1. International Committee of Medical Journal Editors. Uniform requirements for manuscripts submitted to biomedical journals. Respir Care 1997;42(6):623-634.
2. World Medical Association. Declaration of Helsinki. Respir Care 1997;42(26):635-636.
3. Manuscript Preparation Guide. Respir Care 1997;42(6):643-646.
4. Fluck R Jr. Avoiding the 'Tower of Babel' in RESPIRATORY CARE. Respir Care 1997;42(6):599-600.
5. Amdur RJ, Biddle C. Institutional review board approval and publication of human research results. JAMA 1997;277(11):909-914.
6. Hess DR. Ethics of human research and institutional review boards. American Association for Respiratory Care International Convention and Exhibition, San Diego CA, November 6, 1996.
7. Craig KC. Regulatory and ethical issues in clinical research. In: Chatburn RL, Craig KC. Fundamentals of respiratory care research. East Norwalk CT: Appleton & Lange, 1988. p. 15-26.

8. Goldby S. Experiments at the Willowbrook State School. Lancet 1971;i:749.
9. Beecher HE. Ethics and clinical research. N Engl J Med 1966;274: 1354-1360.
10. Brandt AM. Racism and research: the case of the Tuskegee syphilis study. Hastings Cent Rep 1978;8:21-29.
11. Rothman DJ. Ethics and human experimentation: Henry Beecher revisited. New Engl J Med 1987;317(19):1195-1199.
12. Appendix II (The Nuremberg Code). In: Beauchamp TL, Childress JF. Principles of biomedical ethics. New York: Oxford University Press, 1979:287-289.
13. Djundae H, Cardinal P, Greffe-Laliberté G, Jones G, Snell CC. Does a ventilatory management protocol improve the care of ventilated patients? Respir 1997;42(6):604-610.
14. Sinkovic A. Acute respiratory failure from neck hematoma following venous cannulation in a patient receiving streptokinase. Respir Care 1997;42(2):214-217.
15. Edelman DA, A van Os WA. Safety of intranasal beclomethasone dipropionate: a review. Respir 1996;41(11):1020-1025.
16. Bishop CT. How to edit a scientific journal. Philadelphia: ISI Press, 1984.

Correspondence: Kris Williams, RESPIRATORY CARE, 11030 Ables Lane, Dallas TX 75229, or e-mail williams@aarc.org

43rd International Respiratory Congress
December 6-9 • New Orleans, Louisiana

Does a Ventilatory Management Protocol Improve the Care of Ventilated Patients?

Hélène Djunaedi RRT, Pierre Cardinal MD FRCP(C), Ginette Greffe-Laliberté RRT, Gwynne Jones MBBS, FRCP(UK) FRCP(C), Ba' Pham MMath, and Cathy Carter Snell RN MN

BACKGROUND: We developed a comprehensive ventilatory management protocol that enables the respiratory therapist to adjust ventilator settings without physician orders. METHODS: We conducted a retrospective review of 50 ventilated patients from the preprotocol period and 57 patients from the postprotocol period. Variables measured included the ability to rest patients totally, number of tachypneic events, the time to respond to abnormal arterial blood gas values or oxygen saturations by pulse oximetry (S_{pO_2}) and the subsequent change in ventilator settings, and the duration of mechanical ventilation. These were evaluated before and after the introduction of the protocol. RESULTS: When the goal of mechanical ventilation was to rest patients completely, we observed 282.3 episodes of spontaneous breathing in every 1,000 patient assessments during the preprotocol period but only 218.3 episodes during the postprotocol period. This difference was not statistically significant. However, during weaning, we observed a significant reduction in the number of tachypneic events (respiratory rate greater than 30/min, expressed as rate/1,000) from 186.3 in the preprotocol group, to 102.6 in the postprotocol group (rate/1,000). The median response time was more than 3 times faster in the postprotocol group (10 min) than in the preprotocol group (31 min) ($p = 0.0001$). There were no statistically significant differences in the duration of mechanical ventilation between the preprotocol group (3.18 days) and the postprotocol group (3.89 days) (median, $p = 0.39$). CONCLUSION: Although the duration of ventilation was not altered, the introduction of this protocol has significantly improved patient comfort as evaluated by the reduction in tachypneic events and has led to an important reduction in the time to respond to abnormal blood gas and pulse oximetry values. Furthermore, it has formalised a method to totally rest patients in acute respiratory failure. [Respir Care 1997; 42(6):604-610]

Background

Mechanical ventilation can be life saving, but its use is, unfortunately, not without adverse effects. Excessive oxygen concentrations, high transpulmonary pressures, and high inspiratory volumes may all damage the lungs, thus prolonging the duration of mechanical ventilation.[1] In addition, mechanical ventilation may not only perpetuate lung injury but may also adversely affect the ventilatory pump. When spontaneous ventilatory activity is totally suppressed, respiratory muscles may weaken and possibly atrophy.[2-4] Conversely, when mechanical ventilation fails to unload the overburdened respiratory muscles, fatigue may ensue.[5,6]

Ms Djunaedi is a Charge Respiratory Therapist in the Intensive Care Unit, Dr Cardinal is a Respirologist and Director of the Intensive Care Unit, Ms Greffe-Laliberté is Coordinator of Education for the Respiratory Therapy Department, Dr Jones is a Respirologist, and Mr Pham is a Biostatistician—Ottawa General Hospital. Ms Snell is a Registered Nurse working as a critical care consultant and session instructor for Mount Royal College, Calgary, Alberta. Dr Cardinal and Dr Jones are also Associate Professors, Department of Medicine, University of Ottawa—Ottawa, Ontario, Canada.

Correspondence: Hélène Djunaedi, Ottawa General Hospital, 501 Smyth Road, Room 1301, Ottawa, Ontario, Canada, K1H 8L6.

It follows that the goals of mechanical ventilation vary from total rest to intense training. However, the variable lung mechanics during severe to resolving illness necessitate frequent ventilator adjustments. Weaning protocols are developed to ensure that ventilatory support can be safely withdrawn. They rely on frequent assessment of patient response to ventilator setting changes. These protocols, which provide a consistent approach to mechanical ventilation and weaning, have been shown to shorten the duration of mechanical ventilation[7-9] and to improve patient comfort.[10] However, their use is often restricted to specific populations or to patients already meeting weaning and extubation criteria, thus limiting their application in general intensive care units.

We developed a comprehensive ventilatory management protocol[11] that enables the respiratory therapist to adjust the ventilator settings according to a standardized physical assessment, to continuous oxygen saturations measurements by pulse oximetry (S_{pO_2}), and when needed, to arterial blood gas results. This ventilatory management protocol is divided into four different phases, each with specific goals targeted to the evolving needs of the patients. These phases can be used from the time of intubation until the time of extubation in patients with heterogeneous medical problems. During Phase I, patients are rested totally. In Phase II, ventilatory support is gradually withdrawn to allow patients to take over some of the work of breathing. Phase III is used to determine the readiness of patients for extubation. Phase IV is used for patients requiring interval training to strengthen their respiratory muscles. Because respiratory therapists assess the patient frequently for physical signs known to predict either fatigue or an excessive respiratory load, the use of this protocol allows the team to initiate the weaning process soon after intubation—even before the underlying disease has completely resolved.

This study was undertaken to determine whether the introduction of this ventilatory management protocol had improved our ability to rest patients totally following acute respiratory failure, to decrease tachypnea during weaning, to shorten the time to respond to abnormal arterial blood gas results, and to decrease the duration of mechanical ventilation.

Methods

Design

A retrospective chart review was conducted on ventilated patients admitted to the Medical/Surgical Intensive Care Unit (ICU) at the Ottawa General Hospital. The retrospective design was chosen because of the difficulty in conducting such a trial in a prospective manner without having one treatment arm contaminate the other. The introduction of the protocol demanded special training in patient assessment for all respiratory therapists as well as in-service programs for other members of the health care team. In a prospective trial, this process would have influenced the results obtained from the control arm and would have, therefore, biased the conclusions.

We reviewed only patients ventilated for respiratory failure and weaned with conventional modes of ventilation from December 1990 until May 1992 (preprotocol group) and from September 1992 until August 1994 (postprotocol) group. In the preprotocol period, ventilator settings were changed according to physician order; whereas in the postprotocol period, changes were made according to the Ventilatory Management Protocol.

Our philosophy of weaning did not change with the introduction of the Ventilatory Management Protocol. This protocol, which expanded the role of respiratory therapists, simply extended and refined our past philosophy. Therefore, we were able to retrospectively identify the different phases of ventilation in the preprotocol as well as in the postprotocol period. To ensure a reliable comparison between the pre- and postprotocol periods, we used the same criteria to define the beginning and end of each phase for both periods. These criteria were defined by the authors before the review of the medical records. Phase I usually followed intubation and was used to totally rest patients. During this period, the ventilatory rate was set at ≥ 12 and was not lowered unless there was an alkalemia. Phase II consisted of the gradual withdrawal from synchronized intermittent mandatory ventilation (SIMV), which was then followed by the reduction in the level of pressure support. The initial reduction in the set ventilator rate indicated the beginning of Phase II, whereas the end was determined by reaching a pressure support level of 10 cm H_2O. Phase III involved either continuous positive airway pressure (CPAP) with pressure support ≤ 9 cm H_2O or a T-piece trial. In Phase IV, periods of training (Phase III) alternated with periods of partial rest (Phase II).

Protocol

The health care team evaluates the ventilatory support every day and determines the settings that best suit the needs of the patient. The respiratory therapist, the nurse, and the physician communicate with one another as necessary. A physician's order is necessary to change from one phase to another. Phases can be skipped when the patient's clinical progress indicates it because failure to do so could unnecessarily lengthen the patient's ventilator dependency time.

Following intubation, the respiratory therapist initiates ventilation according to Phase I, unless otherwise ordered by the physician.

Phase I

Mode:	SIMV with Pressure Support (PS) MAX or Assist/Control (at the discretion of the respiratory therapist)
Rate:	12/min
Tidal volume:	10 mL/kg

O_2 concentration:	To maintain saturation above 90%
Positive end-expiratory pressure (PEEP):	Applied initially at 5 cm H_2O unless contraindicated*
PS:	PS MAX (set to obtain a spontaneous tidal volume of 10 mL/kg.)

*Contraindications include low blood pressure and untreated pneumothorax. Higher levels of PEEP require a physician's order.

The respiratory therapist adjusts ventilatory support to achieve respiratory muscle rest and to maintain a pH between 7.35 and 7.45 unless otherwise ordered. Patient assessments are performed every 2 hours.

Physical signs that indicate complete rest (all must be present):
- No use of accessory respiratory muscles.
- No abdominal muscle contraction during expiration.
- No intercostal or supraclavicular indrawing.
- Respiratory rate = ventilator rate (ie, the patient is not breathing above the ventilator)
- Airway pressure (P_{aw}) is reproducible: (1) peak airway pressure does not vary from one breath to the next; (2) the rise in airway pressure is smooth and continuous; (3) no fall in airway pressure occurs at the beginning of inspiration.

Phase II

The SIMV rate is decreased by no more than 2 breaths/min at a time, until a rate of 4 is reached. Then the mode is changed to CPAP, and the PS is decreased by no more than 20% of PS MAX at a time, until a pressure support of 10 cm H_2O is reached. The respiratory therapist assesses the patient no longer than 30 minutes after each setting change and every 2 hours, for physical signs of comfort.

Physical signs indicating patient's comfort (Phase II-IV):
- No use of accessory respiratory muscles.
- No abdominal muscle contraction during expiration.
- No intercostal or supraclavicular indrawing.
- Respiratory rate < 30/min.
- No asynchrony or abdominal paradoxical breathing.
- Stable heart rate and blood pressure.
- P_{aw} reproducibility: (1) the rise in airway pressure is smooth and continuous; (2) the fall in airway pressure at the beginning of a volume-cycled breath does not exceed the triggering sensitivity.

Phase III

The ventilator settings used are CPAP and/or pressure support < 10 cm H_2O, to overcome endotracheal tube resistance. A physician's order is required when the medical team agrees that a T-hood or T-piece trial is needed to assess the patient's readiness for extubation. Physical assessments are performed after 15 minutes, 45 minutes, and then every 2 hours to evaluate patient comfort.

Phase IV

The settings are adjusted to allow intermittent respiratory muscle training (Phase II alternating with Phase III). The physician orders the frequency and duration of Phase III. Patient assessments are performed every 30 minutes to evaluate patient comfort. If the patient can tolerate Phase-III periods of more than 2 hours, patient assessments are performed every hour for 2 hours, then every 2 hours.

In Phase II-IV, the ventilator settings are returned to their previous values when a patient cannot be kept comfortable.

Baseline & Outcome Measures

Baseline characteristics including age, gender, APACHE II score, and diagnosis on admission to ICU were recorded on all patients. To determine whether the protocol had improved our ability to rest patients totally following acute respiratory failure, we divided the number of episodes during which each patient was breathing spontaneously by the number of patient assessments performed routinely every 2 hours (Phase I Performance Indicator). To evaluate the incidence of tachypnea during weaning, (Phases II-IV), we used a Tachypnea Index derived by dividing the number of tachypneic events (respiratory rate > 30) by the number of routine assessments during which a patient was breathing spontaneously. Although the Ventilatory Management Protocol incorporates parameters such as P_{aw} reproducibility and physical signs of rest and comfort, this study did not permit us to use them as performance indicators because they were not part of the standard patient evaluations in the preprotocol period. The response time was defined as the elapsed time (as indicated on the requisition) between the sampling of arterial blood that proved to yield abnormal results or of obtaining an abnormal S_{pO_2} result and the subsequent change in ventilator settings. The changes in PEEP and Phases were not recorded to measure the response time as these changes needed a physician's order. The duration of mechanical ventilation in the ICU was also recorded.

Statistical Analysis

The Phase I Performance Indicator and the Tachypnea Index were calculated as recurrent rates/1,000 observations with their corresponding confidence intervals.[12] The response time (min) to abnormal blood gas results or S_{pO_2} readings was summarized as follows: first, we determined whether a patient had abnormal results, then, we obtained the median number of ventilator adjustments and the best, median, and worst response time for the individual patient. These values were averaged

to provide response profiles for the pre- and postprotocol groups. Wilcoxon rank-sum was used for continuous outcomes and Fisher's exact tests for categorical outcomes. Life-table curves for time to extubation of the pre- and postprotocol groups were generated, and a log-rank test was used to compare the two curves.[13]

Results

Of the 134 patients considered, 66 were from the preprotocol period and 68 from the postprotocol period. From the pool of all mechanically ventilated patients whose records were complete and who met study criteria, an average of 4 patients/month were selected for study. (An 'out-of-the-hat' process was used for preprotocol selection; computer-driven random selection was used postprotocol.) We excluded 27 patients: 6 patients with incomplete medical records; 12 patients who were intubated for airway protection only; 3 patients who were hyperventilated for elevated intracranial pressures; 1 patient who was ventilated with high-frequency ventilation; and 5 patients who were extubated or who died before the weaning process was initiated. Following exclusion of these patients, 50 patients from the preprotocol and 57 patients from the postprotocol group were available for analysis. As described in Table 1, baseline characteristics were similar in both groups.

The goal of Phase I was to rest patients completely. As can be seen in Table 2, the introduction of the protocol led to a 22% reduction in the proportion of time that patients breathed spontaneously during Phase 1. The overlapping confidence intervals however, indicate that this improvement was not statistically significant. The goal of Phase II was to withdraw ventilatory support while keeping patients comfortable. We observed a 45% improvement in the Tachypnea Index with the protocol, which was both clinically and statistically significant.

Table 1. Characteristics of Mechanically Ventilated Patients Studied before and after Institution of Ventilatory Management Protocol

Variable	Preprotocol (n = 50)	Postprotocol (n = 57)
Age (years)*	61(21)	62 (21)
Gender (% male)	50	46
APACHE II Score*	21.8 (7.5)	19.8 (6.3)
Ventilation Time (%)		
< 24 h	16	28
24-72 h	36	14
> 72 h	48	58
Reason for Admission (%)		
Postoperative support	26	27
Multiple trauma	16	13
Sepsis	9	9

*Values are mean (SD).

We noted a trend towards a greater number of patients requiring ventilator parameter adjustments in the postprotocol as compared to the preprotocol period. The median number of adjustments in response to abnormal blood gas or S_{pO_2} values was essentially the same between the two groups. However, the best, median, and worst response times were all significantly shorter following the introduction of the protocol.

No statistically significant differences were seen in the duration of mechanical ventilation between the two groups. As depicted in Figure 1, the proportions of patients who remained intubated were almost indistinguishable in the two groups until Day 12.

Discussion

We have developed a ventilatory management protocol that relies primarily on respiratory therapists to adjust parameters of ventilation based on standardized patient assessment. The

Table 2. Outcome Measures before and after Institution of the Ventilatory Management Protocol

Measure	Preprotocol (n = 50)	Postprotocol (n = 57)	p Value*
Phase I Performance† (rate/100, 95% CI)	282.3 (192.4-372.3)	218.3 (152.6-284.0)	
Tachypnea Index‡ (rate/1000, 95% CI)	186.3 (150.1-218.2)	102.6 (60.4-128.2)	
Response Time			
Patients with adjustment (%)	33 (66)	46 (80.7)	0.12
Median number of adjustments (25, 75 quantiles)	2 (0, 4.75)	2 (1,8)	0.18
Median best response time§(25,75 quantiles)	5 min (3.25,23.75)	0 min (0.5)	0.0006
Median response time overall§ (25, 75 quantiles)	30.5 min (17.25, 54.5)	10 min (5.0, 20.0)	0.0001
Median worst response time (25,75, quantiles)	108 min (41.25, 162.5)	27.5 min (11.25, 102.2)	0.0032
Median ICU ventilation duration (25,75 quantiles)	3.18 days (1.75, 7.13)	3.89 days(2.36, 8.27)	0.39‖

*Wilcoxon rank-sum test for continuous outcomes and Fisher's exact test for binary outcomes.
† Number of times patients were breathing spontaneously divided by number of assessments.
‡ Number of episodes with a total respiratory rate > 30/min divided by the number of assessments.
§ Within-patient response time.
‖ Log-rank test.

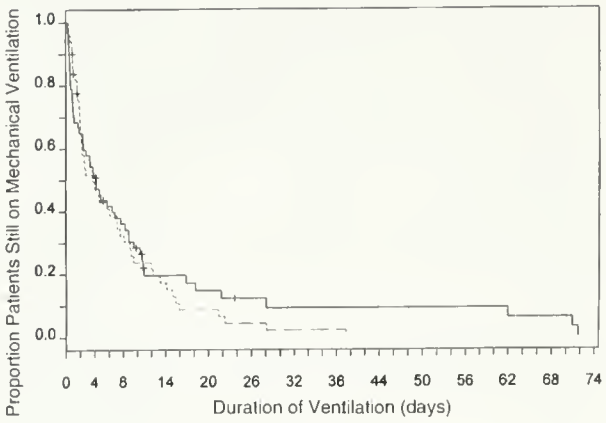


Fig. 1. Proportion of patients who remained on mechanical ventilation over time. The proportions of patients who remained intubated were almost indistinguishable in the preprotocol group (M = 50, – – –) and the postprotocol group (M = 57, ——) until Day 12. The observed difference after 12 days was explained by the extended periods of ventilation of only a few patients. These patients were ventilated for prolonged periods because of the severity of their underlying diseases. The median duration with 95% CI preprotocol was 3.72 (2.22, 7.59) days and postprotocol was 4.20 (2.38, 8.29) days—statistically insignificant values by log-rank test (p = 0.48). Patients who died were marked with vertical line on both curves.

introduction of this protocol has enhanced patient comfort and has shortened the response time to abnormal S_{pO_2} and ABG results. In addition, the protocol may have improved our ability to rest patients completely, although this finding did not reach statistical significance. However, we observed no difference in the duration of ventilation between the preprotocol and postprotocol periods.

We believe that this protocol is valuable in that it can be used not only in patients meeting weaning/extubation criteria but also in a heterogeneous population of critically ill patients from intubation until extubation. In addition, this protocol, which is based on sound physiologic principles directed by structured physical assessments, remains versatile. Close and reliable follow-up allows the team to better adapt the duration and timing of the various phases and the threshold values of monitored variables, such as blood gas values or respiratory rate, to the specific needs of each patient.

We believe this ventilatory management protocol to be the first to include a phase that details how ventilated patients are to be rested following intubation. The introduction of the protocol led to a relative improvement of 22% in our ability to rest patients. Although this difference was felt to be clinically important, it did not reach statistical significance. However, the systematic monitoring of other indicators, such as the use of accessory muscles and the inspection of the inspiratory pressure contour further refined our ability to completely rest patients in the postprotocol period. We believe that structured patient evaluations are crucial to ensure total patient rest. The simple prescription of a set ventilator rate and volume (without close patient follow-up by structured assessment) does not guarantee total patient rest. Inspiratory muscle activity may persist after the assisted breath has begun, resulting in a high level of work.[14,15] In this setting, controlled mechanical ventilation would not rest the patient but rather lead to respiratory muscle fatigue and, possibly, prolong the duration of artificial ventilation. Ward and colleagues[15] demonstrated that the monitoring of inflation pressure contour is a simple means to ensure muscle rest.

In our study, the duration of total rest was relatively short and averaged only 1 day in both the pre- and postprotocol groups. This short period of total rest likely reflects the philosophy of ventilation in our institution that favors attempts at withdrawing ventilatory support as soon as possible, even before the underlying disease has completely resolved or markedly improved. The objective of this practice is to maintain a balance between the beneficial effects of a period of total rest on respiratory muscle fatigue[4-6] and the risk of developing muscle weakness or even atrophy if this period is excessively prolonged.[2,3,16,17] In contrast, 2 large multicenter trials[18,19] evaluating the effects of different modes of ventilation on weaning have attached little importance to this period of rest. In the study of Esteban et al,[19] the weaning process was not initiated until the cause for instituting mechanical ventilation had resolved or improved markedly. In addition, patients also had to meet specific objective criteria before a reduction in ventilatory support was even contemplated. As a result, patients were fully ventilated for approximately 8 days before weaning was initiated, a period much longer than the 1 day observed in our institution. This difference could not be explained by patient characteristics given that our patient population had higher APACHE II scores than those in the Esteban et al study. Furthermore, in Esteban's study, as many as 68% of all patients were successfully extubated after their first attempt at a T-piece trial. Similar results were also obtained by Brochard.[18] In that study, as many as 76% of patients were successfully extubated after their first attempt at weaning (a 2-hour T-piece trial), which took place 14 days after intubation (on average). These results suggest that the usual practice of delaying the weaning process until the underlying disease has almost completely resolved may extend unnecessarily the period of total rest.

Although advising shorter periods of rest may be considered premature, we believe that close patient monitoring protects against the risks of further injuring the already stressed respiratory muscles. Brochard et al[5] have shown that clinically apparent sternocleidomastoid muscle use correlates well with the development of electromyographically proven respiratory muscle fatigue. In addition, the increase in respiratory rate has also been shown to be a sensitive indicator of respiratory muscle fatigue or excessive respiratory load[20] that even precedes changes in arterial blood gases.[6] Although no studies have identified a specific respiratory rate associated with respiratory fatigue, various studies[7,10] evaluating weaning pro-

tocols have used a respiratory rate of 30 as an indicator of weaning failure. Therefore, we believe that the close monitoring of these two indicators ensures patients safety and protects against the risk of respiratory muscle fatigue, thus allowing for an earlier initiation of weaning.

The method of gradually decreasing the SIMV rate while using pressure support has been used by various authors of weaning protocols. However, to our knowledge no published articles have evaluated the advantages of SIMV with pressure support over pressure support alone as a method of weaning. We believe that withdrawal of ventilatory support is best initiated by first reducing the SIMV rate and then the level of pressure support. We prefer to gradually decrease the SIMV rate because a sudden transition from total ventilatory support to pressure support only may significantly increase the work of breathing because it forces patients to initiate each breath. It is understood that, in some patients, the medical team may adjust the frequency of ventilator parameter changes to speed up or slow down the weaning process.

The introduction of this protocol significantly improved patient comfort as assessed by the frequency of tachypneic events. The Tachypnea Index almost halved in the postprotocol period as compared to the preprotocol period. We elected not to monitor Likert or Visual Analog Scales to measure comfort because these measurements, unlike the respiratory rate, require patient cooperation. These measurements are not easily obtained in many critically ill patients, particularly those receiving narcotics and/or sedatives. Furthermore, dyspnea scores have been shown to display little variation in response to the withdrawal of ventilatory support.[21,22]

We also observed a 300% decrease in the response time to abnormal blood gas results following the introduction of the protocol. Taken together, these results suggest that this ventilatory management protocol truly improved the comfort and safety of mechanical ventilation. In spite of greater patient comfort and faster responses to abnormal blood gas results, we did not observe a reduction in the total duration of mechanical ventilation following the introduction of the protocol. The variability of the patient population and the rate of resolution of the underlying disease resulted in widely differing duration of ventilation among patients. With our observed variance, we estimate that it would have required randomization of more than 1,700 patients to each group to detect a 20% decrease in the duration of ventilation (power of 80% and a error of 0.05). Although the duration of ventilation in the preprotocol group was 36 hours shorter than in the postprotocol group, this difference was not statistically significant. As depicted in Figure 1, there was no difference in the duration of ventilation for patients ventilated fewer than 12 days. The observed difference after 12 days was explained by the extended periods of ventilation of only a few patients. The exclusion of outliers with duration of mechanical ventilation exceeding 2 standard deviations from the overall mean (mean of both the pre- and postprotocol groups), narrowed the difference in the duration of ventilation to only 1 hour. In trials in which various weaning methods or protocols were shown to alter the total duration of ventilation, patients were selected only if they met specific weaning criteria or if they shared a common diagnosis.[8,10] Although tighter patient selection greatly reduced the variation in ventilation time, thus increasing the power of these studies, it also limited ability to generalize the findings to a broader population. Nevertheless, the absence of any improvement in the duration of ventilation raises concerns with regards to the protocol itself. Was the protocol aggressive enough? Could the withdrawal of ventilatory support have proceeded more rapidly in some patients without causing undue harm? It is the answers to these and many other questions that will help us refine our protocol. However, we believe that a greater involvement of respiratory therapists in the assessment of patients and the decision-making process will always be a key component of any protocol aimed at improving the quality of care.

Conclusions

In conclusion, the implementation of a Ventilatory Management Protocol has enhanced patient comfort and has improved the time to respond to abnormal blood gas or S_{pO_2} values. The protocol has also formalised a method to totally rest patients in acute respiratory failure. Close patient monitoring has enabled our health care team to initiate weaning early, even before the underlying disease has completely resolved. We were, however, unable to demonstrate a reduction in the total duration of mechanical ventilation. We believe that this Ventilatory Management Protocol has greatly enhanced the communication and mutual respect among members of the health care team, improving the quality of care in our institution.

REFERENCES

1. Tobin MJ. Mechanical ventilation. N Engl J Med 1994;330(15): 1056-1061.
2. Anzueto A, Tobin MJ, Moore G, et al. Effect of prolonged mechanical ventilation on diaphragmatic function: a preliminary study of a baboon model (Abstract). Am Rev Respir Dis 1987;135:A201.
3. Booth FW. Effect of limb immobilization on skeletal muscle. J Appl Physiol 1989;52(5):1113-1118.
4. Braun NM, Faulkner J, Hughes RL, Roussos C, Sahgal V. Clinical conference in pulmonary disease: when should respiratory muscles be exercised? Chest 1983;84(1):76-84.
5. Brochard L, Harf A, Lorino H, Lemaire F. Inspiratory pressure support prevents diaphragmatic fatigue during weaning from mechanical ventilation. Am Rev Respir Dis 1989;139(2):515-521.
6. Cohen CA, Zagelbaum G, Gross D, Roussos C, Macklem PT. Clinical manifestations of inspiratory muscle fatigue. Am J Med 1982; 73(3):308-316.
7. Strickland JH Jr, Hasson JH. A computer-controlled ventilator weaning system. A clinical trial. Chest 1993;103(4):1220-1226.
8. Wood G, MacLeod B, Moffatt S. Weaning from mechanical ven-

tilation: physician-directed vs respiratory-therapist-directed protocol. Respir Care 1995;40(3):219-224.
9. Strickland JH Jr, Hasson JH. A computer-controlled ventilator weaning system. Chest 1991;100(4):1096-1099.
10. Foster GH, Conway WA, Pamulkov N, Lester JL, Magilligan DJ Jr. Early extubation after coronary artery bypass: brief report. Crit Care Med 1984;12(11):994-996.
11. Djunaedi H, Cardinal P, Greffe-Laliberte G, Jones G. A ventilatory management protocol adaptable ot the patient's needs. Can J Respir Ther 1996;32:49-53.
12. Stukel AT, Glynn RJ, Fisher ES, Sharp SM, Lu Yao G, Wennberg JE. Standardized rates of recurrent outcomes. Stat Med 1994;13 (17):1781-1791.
13. Matthews DE, Farewell VT. Using and understanding medical statistics. Basel, Switzerland: Karger; 1985.
14. Marini JJ, Rodriguez RM, Lamb V. The inspiratory workload of patient initiated mechanical ventilation. Am Rev Respir Dis 1986;134(5): 902-909.
15. Ward ME, Corbeil C, Gibbons W, Newman S, Macklem PT. Optimization of respiratory muscle relaxation during mechanical ventilation. Anesthesiology 1988;69(1):29-35.
16. Booth FW, Kelso JR. Production of rat muscle atrophy by cast fixation. J Appl Physiol 1973;34(3):404-406.
17. Witzmann FA, Kim DH, Fitts RH. Hind limb immobilization: length-tension and contractile properties of skeletal muscles. J Appl Physiol 1982;53(2):335-345.
18. Brochard L, Rauss A, Benito S, Conti G, Mancebo J, Rekik N, et al. Comparison of three methods of gradual withdrawing from ventilatory support during weaning from mechanical ventilation. Am J Respir Crit Care Med 1994;150(4):896-903.
19. Esteban A, Frutos F, Tobin MJ, Alia I, Solsona JF, Valverdu I, et al. A comparison of four methods of weaning patients from mechanical ventilation. Spanish Lung Failure Collaborative Group. N Engl J Med 1995;332(6):345-350.
20. Gravelyn R, Weg JG. Respiratory rate as an indicator of acute respiratory dysfunction. JAMA 1980;244(10):1123-1125.
21. Bouley GH, Froman R, Shah H. The experience of dyspnea during weaning. Heart-Lung 1992;21(5):471-476.
22. Knebel AR, Janson-Bjerklie SL, Malley JD, Wilson AG, Marini JJ. Comparison of breathing comfort during weaning with two ventilatory modes. Am J Respir Crit Care Med 1994;149(1): 14-18.

43rd International Respiratory Congress
December 6-9 • New Orleans, Louisiana

Evaluation of an Assessment Tool for Equipment Management (ATEM) of Home Oxygen Concentrators

Karen M Pfaff RN, Larry E Johnson MD PhD, Phillip J Savage CRTT, and John R Kues PhD

BACKGROUND: We sought to assess clients' or caregivers' ability to accurately and safely manage home oxygen equipment and backup systems. Forms commonly used for client assessment by home oxygen equipment providers were compared to the Assessment Tool for Equipment Management (ATEM) of home oxygen concentrators (HOC). The ATEM addresses standards for knowledge assessment recommended by the Joint Commission on Accreditation of Healthcare Organizations including knowledge of liter flow, hours of daily use, oxygen safety and emergency procedures, equipment maintenance and storage, use of backup supplies, and response to equipment malfunction. METHODS: Five regional home care companies recruited 70 subjects who were first-time users of HOC; hospice clients were excluded. Participants were interviewed twice during in-home visits by a different employee each time. They were randomized to be assessed initially by either the ATEM or the company documentation form. The first interview was within 5 days of equipment set-up and training. The second interview, using the remaining assessment tool, took place an average of 3.2 days later, with the interviewer blinded to the first assessment results. The company documentation forms were then independently scored using the ATEM format. RESULTS: Compared with the ATEM, company documentation forms provided less specific and complete information. Company forms were also more subjective in their assessment of knowledge of proper management of equipment. The ATEM identified high-risk knowledge deficits related to equipment management more than 16 times more often than standard instruments (67 deficits vs 4 deficits detected) ($p < 0.001$). Three of 5 companies recorded no knowledge deficits or functional problems in 39 clients, while the ATEM found 36 deficits in the same population. CONCLUSIONS: The ATEM comprehensively assesses knowledge and functional ability of clients or caregivers to manage HOC safely and with greater sensitivity than other assessment forms. The ATEM facilitates documentation by providing both visual cuing and well-defined criteria for scoring and identifies potentially critical knowledge deficits far more often. [Respir Care 1997;42(6):611-616]

Introduction

It is estimated that 600,000-800,000 persons in the United States use home oxygen equipment.[1,2] The National Association of Medical Equipment Suppliers estimates that 6,000-10,000 companies provide home oxygen in the United States, at a cost of $1.4-3.0 billion.[1,3] The Joint Commission on Accreditation of Healthcare Organizations (JCAHO), which provides standards for assessment, education, and documentation of appropriate care or services for accredited companies, requires documentation that clients or caregivers understand how to correctly and safely use home medical equipment.[4]

Ms Pfaff, Dr Johnson, and Mr Savage are associated with Franciscan Home Health Services. Dr Kues and Dr Johnson are associated with the Department of Family Medicine, University of Cincinnati Medical Center—Cincinnati, Ohio.

A version of this paper was presented by Ms Pfaff at OPEN FORUM during the 42nd AARC International Convention & Exhibition, in San Diego, California, November 3-6, 1996.

Reprints & Correspondence: Larry E Johnson MD PhD, University of Cincinnati Medical Center, Department of Family Medicine, P O Box 670582, Cincinnati OH 45267.

Long-term oxygen therapy is provided to individuals who have severe disease. The high mortality associated with the requirement for this therapy (up to 30% at 1 year, 50% at 2 years, and 57% at 3 years),[5] the cost of home oxygen, and the prevalence of noncompliance,[6,7,8,9,10] as well as the potential hazards of oxygen use,[11,12] mandate that oxygen be supplied to persons who understand how to use it properly. Most studies of home oxygen use are limited to its medical management and benefits, and do not address practical issues of monitoring the client and caregiver on their knowledge about its safe and proper use.[3,9,13,14] We found there was little research on practical or creative ways to assess clients who receive long-term home oxygen therapy and that many organizations providing home oxygen equipment were having difficulty measuring how well their clients or their responsible caregivers were managing the use of the equipment. These companies were requesting a more appropriate documentation tool. The Assessment Tool for Equipment Management (ATEM) of home oxygen concentrators was designed to reliably measure client and caregiver knowledge and demonstrated ability to manage home oxygen equipment safely. This study compares the ATEM with commonly used alternative assessment formats.

Description of Assessment Tool

The ATEM (Appendix 1) of home oxygen concentrators assesses the knowledge and capability of the client or responsible caregiver to demonstrate the correct and safe use of oxygen equipment. There are 10 questions covering correct liter flow rate, hours to be used daily, basic concentrator operation, oxygen safety, equipment cleaning and maintenance, proper storage and placement of the concentrator, correct use of the backup cylinder, cylinder capacity, what to do for equipment malfunction, and what to do in a medical emergency. Clients or their caregivers are given scores on each of these; higher scores are given for a correct demonstration or explanation, or for errors that are minor and should not threaten a client's health. Lower scores are given for verbal responses or demonstrations that may place a client or other household members at significant risk of harm. In contrast to dichotomous scoring methods, the ATEM allows measurement of partial knowledge deficits. The ATEM provides guidelines on how to judge and score greater or lesser risk. Instances in which a client or caregiver correctly understands how to use the equipment but is noncompliant would be specifically addressed elsewhere on the individualized plan of care. The ATEM is used at each client visit to identify areas of potential risk and educational opportunities.

Evaluation Method

Seventy (nonhospice) clients, who were recruited from 5 different home oxygen supply companies and who were receiving oxygen concentrators for the first time, were enrolled in this comparison study. Each company contributed 8 to 20 subjects to the study. The study was approved by the University of Cincinnati and the Franciscan Health System Institutional Review Boards.

Participants were interviewed by 2 different company employees during in-home visits, following equipment set up training. The employees were blinded to the results of the previously administered evaluation. The participants were not informed that the evaluations were different. The first interview occurred 2 to 5 working days following the initial set up, and the second followed, on average, 3.2 days later. The subjects were randomized to be evaluated by either the ATEM initially or the company documentation. Half were evaluated by the ATEM first and the company documentation last; the other half were evaluated by the company document first, and the ATEM last.

The company documentation was separately scored using the ATEM scoring format. We omitted Number 3 because we believed we could clearly separate high and low risk (Appendix 1). Results from the 2 documentation formats were compared for each subject.

Knowledge deficits found using the ATEM were compared to those detected from the standard company documentation forms using a difference of proportion test.

Results

Documentation

Home oxygen suppliers use a wide variety of documentation methods, most commonly narrative, 'canned' care plans using fill-in-the-blank responses, or yes-no checklists. Examples from several company assessment tools are shown in Figure 1. The progress note/narrative format provides the least specific and consistent information. The assessors frequently use comments like "good working knowledge" without further details. Narrative documentation is also difficult to scan for information. It does not facilitate the collection of measurable outcomes, and it is difficult to compare sequential assessments.

Although better than narrative, the other forms did not comprehensively cover all 10 areas of client knowledge assessed by the ATEM. Most documentation described observations (eg, that the oxygen flow was set correctly) but not specifically whether the client knew what the correct flow should be and how to correct it if necessary. A "yes" or "no" check following "assessment of knowledge of physician prescription" does not differentiate L/min, hours/day, whether the client was asked about the prescription, or if the equipment was still correctly set. A check following "understands/complies with prescribed therapy" does not differentiate the importance between the two nor specify what is included under "prescribed therapy." Most of the company assessment forms that we studied do not address knowledge about use or length of time on the backup cylinders (Fig. 1).

Company A:
Patient responsibilities (check list):
- Understands/complies with prescribed therapy
- Understanding use of back-up system
- Safety precautions re-emphasized

Home environment (check list):
- Equipment safely stored
- Fire precautions

Company B:
Patient/caregiver can demonstrate (yes-no check list):
- Understands alarms/troubleshooting concentrator
- Use of back up system, if provided

Patient/caregiver can determine amount of gas in cylinder
Understands all electrical and general safety precautions

Company C:
Yes-no check list:
- Compliance with MD orders
- Environmental safety adequate
- Storage/handling of cylinders
- Equipment positioned safely

Company D:
Safety/equipment assessment (check list):
- Equipment procedures reviewed
- Emergency procedures reviewed
- Back-up systems reviewed
- Safety measures reviewed
- Routine maintenance procedures reviewed

Company E:
Using the following assessment codes (1 = demonstrates adequate level of knowledge/skill performance; 2 = demonstrates partial knowledge/skill performance; 3 = demonstrates no knowledge/skill performance), the patient/caregiver will be able to verbalize/demonstrate the following goals:
- Safe use of equipment
- Assembly/disassembly of equipment
- Need for backup-emergency
- Reason for compliance to regime

Figure 1. Examples from commonly used home oxygen assessment tools on documenting client or caregiver knowledge about how to correctly and safely use home oxygen equipment.

Many assessment tools specifically ask for demonstrations of concentrator operation, cleaning, or what to do for equipment malfunction. Quantification of client knowledge is lacking in most. One form that graded knowledge and skill used the descriptors "demonstrates adequate level of performance" and "demonstrates partial performance" without further explanation. Using subjective words like "adequate" or "partial" as criteria may not truly document safe independence or critical knowledge deficits. What is "adequate" for one assessor may not be to another.

Detection of Knowledge Risk

The ATEM frequently found substantial knowledge deficits, in contrast to other commonly used assessment formats (Table 1). Despite the variety of assessment forms, no company form was found better than the ATEM at detecting knowledge deficits. Because there were no significant differences among the standard documentation tools in their ability to assess knowledge, their cumulative data were combined for statistical analysis. The ATEM found client or caregiver knowledge deficits in 2-7 of the 10 knowledge areas in up to 37% of the participating companies' audited charts. Except for the area pertaining to knowing what to do in a medical emergency, the ATEM found at least one client from every company with a serious knowledge deficit in each of the other categories. Sixty-seven serious knowledge deficits (of a total of 700 possible deficits, or a detection rate of 9.6%) were found using the ATEM tool compared to 4 (0.6% detection rate) using standard documentation forms ($Z = 7.65$; $p < 0.001$). Three companies documented no knowledge deficits in 39 clients, while the ATEM found 36 in the same 39 clients.

In contrast to standard documentation instruments, the ATEM found significantly more potentially serious knowledge deficits when patients were evaluated on their knowledge regarding oxygen safety (18.6% vs 1.4%; $p < 0.001$), proper equipment storage and placement (17.1% vs 1.4%; $p < 0.001$), proper use of the backup system (21.4% vs 2.9%; $p < 0.001$), length of time remaining on the cylinder (15.8% vs 0%; $p < 0.001$), knowledge about the correct prescription

Table 1. Comparison of Deficits Found by the Assessment Tool for Equipment Management (ATEM) of Home Oxygen Concentrators and Other Assessment Instruments in 70 Patients.

Area of Evaluation	% of Deficits Found by ATEM	% of Deficits Found by Other Assessment Tools	p Value
Knowledge of physician prescription for liter flow	7.1	0	0.02
Knowledge of physician prescription for hours of oxygen use/day	4.3	0	n.s.
Basic concentrator operation	2.9	0	n.s.
Oxygen safety	18.6	1.4	< 0.001
Equipment cleaning/maintenance	7.1	1.4	0.04
Proper storage and/or placement of concentrator	17.1	0	<0.001
Use of back-up cylinder	21.4	2.9	< 0.001
Length of time remaining in cylinder	15.8	0	< 0.001
What to do for equipment malfunction	1.4	0	n.s.
What to do in a medical emergency	0	0	n.s.

n.s. = not statistically significant.

for liter flow (7.1% vs 0 %; p = 0.02), and equipment cleaning and maintenance (7.1% vs 1.4%; p = 0.04) (Table 1). Knowledge deficits concerning oxygen safety, proper placement of equipment, and equipment cleaning place the client and/or his or her family at immediate risk for harm, while not knowing the length of time remaining in a cylinder or how to use the backup cylinder are potentially harmful for the client if the primary oxygen delivery system malfunctions. It could also contribute to continuing injury if the patient does not receive oxygen for the correct dose or time.

Scoring the Evaluations

We originally thought we could have a total score calculated by the ATEM that would stratify risk. In order to do this, we omitted the Number 3 from the evaluation sheet. The total score idea did not work because knowledge deficit in even one category was potentially serious. However, we continued to use 1, 2, 4, 5 scores because we believed the numbers to grade risk were easy to understand.

Discussion

JCAHO requires that suppliers of home oxygen demonstrate a process by which they plan and provide services with appropriate documentation.[4] This should include an evaluation of the clients' or caregivers' ability to comply with equipment use, which demonstrates both knowledge and performance of the specific responsibilities related to equipment use. Similarly, several Oxygen Consensus Conferences have recommended the development of quality assurance standards and on-going education for continuing management of the home oxygen patient.[15,16] Proper documentation helps prevent incomplete care, determines when goals are reached, and expedites clear, meaningful communication among all care providers. Standard formats assist staff to perform tasks in the same manner and to take the same approach to care. An effective care plan should also identify a client's health care service needs.

Current client training on the use of home oxygen equipment may be inadequate.[17,18] Many clients on home oxygen therapy receive only a few minutes of instruction, mainly from the vendor, on its proper use. It is not surprising that there is a high prevalence of noncompliance in using home oxygen as prescribed.[6,8,10,19] Conversely, patients who receive more educational interventions and closer follow-up are more compliant.[8] Emotional and mood disturbances, including depression in up to 50% of patients, and other neuropsychological impairments, are common in persons with hypoxic lung disease and are further barriers to proper compliance and understanding.[7,20,21]

The ATEM (Appendix 1) was designed as an easily readable and administered assessment and documentation tool for the knowledge to correctly manage home oxygen equipment, with well-defined scoring methodology. Clients or caregivers with knowledge deficits in any of a variety of areas can be readily identified, and individualized plans of care can be developed for them. The ATEM format allows for the longitudinal assessment of client or caregiver knowledge in 10 areas from 1 sheet, rather than having to scan through multiple care plans.

The ATEM has 2 major benefits. The first is that it provides more complete and easily understood documentation. It facilitates a more objective and explicit review of client or caregiver knowledge in multiple areas, many of which are neglected in currently used assessment formats. It also provides clearer guidelines for judging knowledge and stratifies knowledge deficits by degrees of risk of potential harm. Current assessment tools may indicate topics for knowledge assessment, but the documentation often does not allow one to determine the degree to which the client understands these individual areas of oxygen equipment management. From most currently used tools, it can only be inferred that a complete knowledge assessment took place. The ATEM, in contrast, comprehensively assesses 10 separate areas of knowledge and permits a rapid evaluation of both current knowledge and any change of knowledge over time. It easily communicates this information to persons who do not see the client frequently.

Several other assessment forms have been proposed. A 25-question knowledge assessment form for patients using home oxygen is available for use at outpatient clinic appointments.[22] While this form does not quantitate degree of risk, it could be modified for the home care setting to assess current knowledge and changes over time. Heslop and Shannon[23] list a variety of issues that should be assessed with home oxygen use, including how oxygen therapy fits into a family's lifestyle, but without a formal scoring format.

The second benefit of the ATEM is that it greatly improves the detection of knowledge deficits when compared to currently used documentation forms. Sixty-seven high-risk knowledge deficits were identified by the ATEM while the combined 5 standard assessment forms detected only 4 deficits. The ATEM is particularly effective at identifying risk regarding oxygen safety, proper equipment storage and maintenance, use of the backup system, and knowing the length of time one has left to use the oxygen cylinder.

While primary care physicians play a crucial role in ordering home oxygen therapy, their lack of training in respiratory care and their frequently inappropriate use of oxygen in other care settings is problematic.[8,24] The ATEM, with its more sensitive detection of knowledge deficits, may facilitate communication regarding complicated patients and improve physician management.[7,10,25,26] Providing information derived from the ATEM to physicians will aid their oversight and may improve patient compliance with the oxygen prescription.

A recent report claims that infrequent contact with patients receiving long term oxygen is cost effective.[27,28] Decreased contact with clients, without thorough assessment of their un-

derstanding of their home oxygen equipment, may make the ATEM even more valuable. In addition, health care under managed care models generally encourages outcomes measurement. The ATEM provides both valuable and quantifiable information regarding knowledge on the appropriate use of expensive services. Finally, the ATEM allows educational efforts to be more efficiently focused on higher risk clients. Increased training on and knowledge about the use of their oxygen equipment may improve compliance and health outcomes, and thereby improve patients' quality of life.[29]

Conclusions

The ATEM comprehensively assesses knowledge and ability of clients or caregivers to safely manage home oxygen equipment with greater sensitivity and structure than many commonly used assessment forms. It facilitates documentation by providing both visual cueing and well-defined criteria for scoring. It also identifies potentially critical knowledge deficits far more often than current forms. Studies are now underway to see how outcomes may be affected by using this tool.

ACKNOWLEDGMENTS

Funding for this study was provided by grants from the Franciscan Health System of the Ohio Valley Inc and the American Association for Respiratory Care. Participants in study support and subject recruitment include Robert Titus, Blaine Singleton, Jason Bryan (American Home Patient, Albany GA), Maria Ohmer, Julie Kneidl, Kim Tutt (Franciscan Home Medical, Cincinnati OH), Wayne Link, Jill Stanley, Jeannette Ward (Link Medical Inc, Lynn NC), William Niedert, Susy Luecke, Dona Feldpouch (Miller Medical Services, Waterloo IA), Angelika Fernholz, Joanne Schroyer, Amy Cherry, Judy Kienle, Jane Sciro, Amy Schlangen (UPC Health Network, Madison WI), Peggi Robart (Chartwell Home Therapies, Waltham MA), and Allan Saposnick (Jordan-Reses, Sharon Hills PA). Marie Marley PhD provided insightful editorial comments, and Debbie Clifford provided secretarial support.

REFERENCES

1. O'Donohue WJ Jr, Plummer AL. Magnitude of usage and cost of home oxygen therapy in the United States (editorial). Chest 1995;107(2): 301-302.
2. O'Donohue WJ Jr. Prescribing home oxygen therapy. What the primary care physician needs to know. Arch Intern Med 1992;152(4): 746-748.
3. Tarpy SP, Celli BR. Long-term oxygen therapy. N Engl J Med 1995;333(11):710-714.
4. 1993 Joint Commission: Accreditation manual for home care: Volume II scoring guidelines. Oakbrook Terrace IL: Joint Commission on Accreditation of Healthcare Organizations, 1993.
5. Dubois P, Jamart J, Machiels J, Smeets F, Lulling J. Prognosis of severely hypoxemic patients receiving long-term oxygen therapy. Chest 1994;105(2):469-474.
6. Howard P, Waterhouse JC, Billings CG. Compliance with long-term oxygen therapy by concentrator. Eur Respir J 1992;5(1):128-129.
7. Walters MI, Edwards PR, Waterhouse JC, Howard P. Long-term domiciliary oxygen therapy in chronic obstructive pulmonary disease. Thorax 1993;48(11):1170-1177.
8. Pepin JL, Barjhoux CE, Deschaux C, Brambilla C. Long-term oxygen therapy at home: compliance with medical prescription and effective use of therapy. ANTADIR Working Group on Oxygen Therapy. Chest 1996;109(5):1144-1150.
9. Strom K, Boe J, Boman G, Midgren B, Rosenhall L. Long-term domiciliary oxygen therapy. Experiences acquired from the Swedish Oxygen Register. Monaldi Arch Chest Dis 1993;48(5):473-478.
10. Strom K, Boe J. Quality assessment and predictors of survival in long-term domiciliary oxygen therapy. The Swedish Society of Chest Medicine. Eur Respir J 1991;4(1):50-58.
11. Maxwell D, McGlashan JA, Andrews S, Gleeson MJ. Hazards of domiciliary oxygen therapy. Respir Med 1993;87(3):225-226.
12. Stogner SW, Payne DK. Oxygen toxicity. Ann Pharmacother 1992;26 (12):1554-1562.
13. Morrison D, Skwarski K, MacNee W. Review of the prescription of domiciliary long term oxygen therapy in Scotland. Thorax 1995;50 (10):1103-1105.
14. Restrick LJ, Paul EA, Braid GM, Cullinan P, Moore-Gillon J, Wedzicha JA. Assessment and follow up of patients prescribed long term oxygen treatment. Thorax 1993;48(7):708-713.
15. Conference report: further recommendations for prescribing and supplying long- term oxygen therapy. Summary of the Second Conference on Long-Term Therapy, Denver CO, December 11-12, 1987. Am Rev Respir Dis 1988;138(3):745-747.
16. Petty TL, O'Donohue WJ Jr. Further recommendations for prescribing, reimbursement, technology development, and research in long-term oxygen therapy. Summary of the Fourth Oxygen Consensus Conference, Washington DC, October 15-16, 1993. Am J Respir Crit Care Med 1994;150(3):875-877.
17. Fauroux B, Howard P, Muir JF. Home treatment for chronic respiratory insufficiency: the situation in Europe in 1992. The European Working Group on Home Treatment for Chronic Respiratory Insufficiency. Eur Respir J 1994;7(9):1721-1726.
18. Rahman S, Howard P. The current status of home oxygen therapy in the United Kingdom. Monaldi Arch Chest Dis 1993;48(5):481-482.
19. Strom K. Survival of patients with chronic obstructive pulmonary disease receiving long-term domiciliary oxygen therapy. Am Rev Respir Dis 1993;147(3):585-591.
20. Lahdensuo A, Ojanen M, Ahonen A, Laitinen J, Poppius H, Salorinne Y, et al. Psychosocial effects of continuous oxygen therapy in hypoxaemic chronic obstructive pulmonary disease patients. Eur Respir J 1989;2(10):977-980.
21. Janssens JP, Penalosa B, Degive C, Rabeus M, Rochat T. Quality of life of patients under home mechanical ventilation for restrictive lung diseases: a comparative evaluation with COPD patients. Monaldi Arch Chest Dis 1996;51(3):178-184.
22. Pfister SM. Home oxygen therapy: indications, administration, recertification, and patient education. Nurse Prac 1995;20(7):44,47-52,54-56.
23. Heslop A, Shannon C. Assisting patients living with long-term oxygen therapy. Br J Nursing 1995;4(19):1123-1128.
24. Cook DJ, Reeve BK, Griffith LE, Mookadam F, Gibson JC. Multidisciplinary education for oxygen prescription: a continuous quality improvement study. Arch Intern Med 1996;156(16):1797-1801.
25. Weitzenblum E. Observance of long-term oxygen therapy at home (editorial). Chest 1996;109(5):1135-1136.
26. O'Donohue WJ Jr. Home oxygen therapy. Med Clin North Am 1996; 80(3):611-622.
27. Gift AG. Follow-up visits for oxygen therapy patients. Perspec Respir Nurs 1996;7(2):5.
28. Cottrell JJ, Openbrier D, Lave JR, Paul C, Garland JL. Home oxygen therapy: a comparison of 2- vs 6-month patient reevaluation. Chest 1995;107(2):358-361.
29. Crockett AJ, Cranston JM, Moss JR, Alpers JH. The MOS SF-36 health survey questionnaire in severe chronic airflow limitation: comparison with the Nottingham Health Profile. Qual Life Res 1996;5(3):330-338.

Appendix 1. The Assessment Tool for Equipment Management (ATEM) of Home Oxygen Concentrators

	Initial Score	Goal	Subsequent Evaluations
Knowledge of physician Rx for liter flow (Score 5,2, or 1)			
Knowledge of physician Rx for hours per day (5,2, or 1)			
Basic concentrator operation (5,4,2, or 1)			
Oxygen safety (5,4,2, or 1)			
Equipment cleaning/maintenance (5,4,2, or 1)			
Proper storage and/or placement of concentrator (5,4,2, or 1)			
Use of backup tank (5,2, or 1)			
Length of time left in tank (5,4,2, or 1)			
What to do for equipment malfunction (5,4,2, or 1)			
What to do in a medical emergency (5,2, or 1)			

Person Scoring _____

Criteria for Scoring the ATEM:

Low Risk

5 When asked, the client/caregiver can independently demonstrate a procedure or give an accurate verbal explanation with all pertinent information included.

4 When asked, client/caregiver can give a partially correct verbal response/demonstration. The errors are minor and would not threaten a client's health. The client may require some verbal cuing or partial reinstruction. No referrals are needed.

High Risk

2 When asked/caregiver gives an incorrect verbal response or demonstration. The error is substantial and could put the client at significant risk for harm. Immediate reinstruction is required, and possibly a referral.

1 When asked, the client/caregiver cannot give a verbal response or is physically unable to perform the task. An alternative care provider should be facilitated.

Note: The ATEM is accompanied by an attachment that provides examples of common "high risk" and "low risk" responses to each of the areas assessed.

©1994, Franciscan Health System of the Ohio Valley, Inc.

Does It Make Sense To Heat Gases Higher than Body Temperature for the Treatment of Cold Water Near-Drowning or Hypothermia?

Introduction

The practice of heating gases higher than body temperature has been recommended by various groups for the treatment of cold water near-drowning and hypothermia. The procedure was popularized in 1972 by Lloyd et al[1] who had hypothermic victims breathe gases heated to 50-80 °C. This landmark study did establish that rewarming occurred, but the risk of airway damage was great at these high temperatures. Many individuals and groups have advocated the use of gases at greater than body temperature (albeit at temperatures lower than suggested by Lloyd et al) based on the premise that considerable heat transfer occurs from the lung parenchyma to the core thoracic organs This held promise as an elegant low-cost alternative for hospitals that lacked other internal rewarming methods, such as extracorporeal membrane oxygenation (ECMO), dialysis, peritoneal lavage, or femoral-femoral bypass. However, attempts to apply this approach has generated problems. Guidelines vary for determining the appropriate temperature of gases delivered to the patient. Most equipment available to providers is simply not designed to safely heat gases to the level suggested by the various groups. The preponderance of literature appears to show a lack of convincing evidence supporting the practice of heating gases higher than body temperature. In short, we seem to be at a point where we need to examine whether this practice really makes sense.

Guidelines

The guidelines for cold water near-drowning and hypothermia issued by the state of Alaska suggest warming gases to 40.5-42.2 °C as a primary rewarming technique;[2] the American Heart Association in the Advanced Cardiac Life Support textbook,[3] recommends an inspired gas temperature range of 42-46 °C; whereas the Clinical Practice Guidelines provided by the American Association for Respiratory Care (AARC) do not address the use of heated gases for the treatment of hypothermia or cold water near-drowning.[4,5] I have read other guidelines suggesting different inspired gas temperature ranges. The consensus among the various guidelines appears to be to favor a higher gas temperature, but what is the rationale for choosing a particular temperature range? If one accepts the hypothesis that heating inspired gases is clearly beneficial for the treatment of cold water near-drowning the obvious choice would be to select the warmest possible temperature that poses no hazard to the patient's airways, but what is that temperature? The literature on human subjects is pretty scant. The Sims et al study[6] of intubated dogs shows tracheal injury at a temperature as low as 40 °C. The often quoted study by Graves and Klein[7] describes "hot pot tracheitis" in a 7-year-old patient ventilated with a gas mixture at 110 °F. The risk for tracheal injury appears to be more pronounced with intubated patients, which makes sense, because the native upper airway can work either to warm or to cool inhaled air. The therapeutic temperature also appears to be close to the maximum safe temperature for the patient's airways.

Equipment

The humidifiers that I personally am familiar with were manufactured in accordance with the International Standards regulations (ISO). One of the ISO standards for humidifiers is that a humidifier should not warm gases above 41 °C within 50 mm of the patient outlet. (This assumes a standard 6-foot tubing length.)[8] It seems obvious that this standard was developed to safeguard patients from exposure to excessive gas temperature. However, this also makes it difficult to deliver gas at temperatures within the presumed therapeutic ranges for hypothermia/cold water near-drowning. Clinicians have developed several strategies to 'beat' the various humidifier's safety system by:

- Shortening the tubing to the least possible length practicable
- Using tubing of the smallest possible diameter
- Disabling the humidifiers safety systems
- 'Tricking' the humidifier temperature probe by placing it outside of the patient circuit
- Adding extra humidifiers or heat sources to the patient circuit

In my experience, the most popular solution employed in Alaskan hospitals appears to be shortening the tubing to the least possible length practicable and adding extra humidifiers to the patient circuit. I know from my own Alaskan experi-

ence that 30-inch circuits can allow delivery of gases at high temperatures indeed. However, caregivers who modify equipment in ways not intended or approved by the manufacturer expose themselves to considerable risk. Dr Martin Nemiroff,[9] who reported personal experience with 1,500 cases of cold water near-drowning, actually fabricated his own device made of a heating coil and a thermos but apparently failed to find a vendor willing or able to make a piece of equipment that would safely heat to the required temperatures. I talked with the humidifier vendors present at the 1996 International Convention and Exhibition of the AARC in San Diego but found no one working to bring such a device to market. These "hypothermia systems" run into further problems if the patient requires bag-valve-mask ventilation. Most caregivers have to run the heated humidified gas into the wide-bore projection used to attach the oxygen reservoir to the bag-valve-mask unit. To my knowledge, the safety of running heated humidified gases into the reservoir has not been studied. Again, such systems require using equipment in ways that the manufacturer never intended. Why haven't vendors stepped forward to make a safe and well-tested device?

Literature

Several studies have shown significant patient rewarming rates using inhalation gas rewarming. Lloyd et al[1] used inspired gas temperatures as high as 50-80 °C, achieving a rewarming rate of 0.54 ± 0.03 °C/h. The patients in question had core temperatures of 24-30 °C and, therefore, were probably not shivering. However, other researchers[10-16] have reported much higher rates of rewarming of 0.8-1.4 °C/h. It is important to note that these studies were done on mildly hypothermic subjects and shivering was a significant confounding variable. Morrison et al[13] demonstrated that the rate of rewarming depends primarily on shivering heat production. A study by Goheen and Giesbrecht[17] demonstrates that when shivering is pharmacologically inhibited rewarming via inspired gas is not an effective strategy. The actual rewarming rate was only 0.23 °C/h versus a control rate (no therapy) of 0.41 °C/h. It is also interesting to note that in a third group in the Goheen and Giesbrecht study a rewarming rate of 2.4 °C/h was achieved using forced air rewarming to the external skin. In a similar study, Hynson and Sessler[18] compared various methods of preventing operative hypothermia and found that forced air rewarming was the most effective treatment to prevent operative hypothermia, followed in effectiveness by the heated water blanket. Patients who received no special therapy and those who received the heated humidified gas differed little with regard to operative temperature loss. Finally, some reports suggest that the potential heat transfer depends on minute ventilation.[19,20] Guild[19] demonstrated that a 70-kg man could be rewarmed at a rate of 0.5 °C/h using an inspired gas temperature of 45 °C if the minute ventilation was about 10 L/min. Several authors have concentrated on the thermodynamics of heat transfer in the respiratory system and have concluded that it simply is not efficacious to rewarm a patient using warmed inspired gases alone. Chatburn and Branson[21] noted in an editorial in this journal that the respiratory system accounts for only about 21% of the total heat loss in most patients. They also noted that most of the heat loss from the respiratory tract is evaporative (insensible). Hudson and Robinson[22] studied the difference between inspired gas and expired gas during ventilation and concluded that the theoretical maximum rewarming rate is about 0.2 °C/h, based on thermodynamic principles. Romet and Hoskins[15] studied patients who were cooled in a whole body calorimeter and then assigned to simply shivering under a blanket, breathing a warmed gas (at one of two levels—40 or 45 °C), or rewarming in water at 40 °C. No significant differences were seen between breathing warmed gas and shivering under a blanket. An additional unintended finding was that the heated inspired gas seemed to lower the patient's basal metabolic rate. In an earlier study, Morrison et al[23] calculated a reduction of 1.4 kJ of heat energy for every 1.0 kJ of inhalational heat added. It is not clear why this occurs. Romet and Hoskins[15] speculated that it is due to some laryngeal cold receptors.

In Closing

There appear to be several issues of concern relating to the continued use of gases heated higher than body temperature for the treatment of cold water near-drowning. The use of such heated gases as a primary means of rewarming a hypothermic patient seems to be no more effective than doing nothing at all. The low rewarming rates reported translate into some very long resuscitations indeed. Even Nemiroff,[9,24] a strong advocate of heated, humidified gases for treating cold water near-drowning did not consider the use of warm inspired gases a primary rewarming technique and referred to the use of heated humidified gases as a "stabilization technique." Further, does it make sense to use a technique that is several times slower than another method of similar complexity? Does it make sense to use a protocol that may, in fact, lower a hypothermic patient's basal metabolic rate?

Some major patient safety issues arise when gases heated to high temperatures are delivered. However, few cases of airway damage from high gas temperatures have been documented. I have several ideas about why this is so. Few people seem to know how to make their patient circuit get that hot. If they devise a system that raises gases to the desired high temperature, they usually have second thoughts when the bag-valve-mask is too hot to hold or the plastic wide-bore tubing begins to melt, and they reduce the system's temperature on that basis alone. Because hypothermic patients who must be intubated generally have poor survival rates, we may underestimate the degree of airway damage that occurs. Spontaneously breathing patients tend to refuse to breath hot gases, which limits their potential for airway damage. However, is

this a risk we need to run? Would it not make more sense to heat inspired gases only to near body temperature and avoid the problem? I believe that the time has come for members of the respiratory therapy profession to come together to work on this problem. Although more research and more data may be needed, researchers have provided us with some reasonable data upon which to base clinical decisions. If a Clinical Practice Guideline for cold water near-drowning or hypothermia were in place, it might provide other groups the impetus for updating their guidelines. The 'bottom line' is that patients deserve the best care that we know how to provide and a clear set of guidelines for the care of the hypothermic, near-drowning patients is an essential first step.

Wayne Wallace BA RRT
Respiratory Care Department
Kodiak Island Hospital & Care Center
Kodiak, Alaska

REFERENCES

1. Lloyd EL, Conliffe NA, Orgel H, Walker PN. Accidental hypothermia: an apparatus for central rewarming as a first aid measure. Scott Med J 1972;17(3):83-91.
2. Ingraham D et al. Cold injuries and cold water near-drowning guidelines: multilevel guidelines, revised. State of Alaska, 1996: p. 22.
3. Billi J, Cummins RO, eds. Instructor's manual for advanced cardiac life support. Dallas: American Heart Association, 1994; p. 11.
4. American Association for Respiratory Care. Clinical practice guideline: humidification during mechanical ventilation. Respir Care 1992; 37(8): 887-890.
5. American Association for Respiratory Care. Clinical practice guideline: bland aerosol. Respir Care 1993;38(11):1196-1200.
6. Sims N, Geoffrion C et al. Respiratory tract burns caused by heated humidification of anesthetic devices in intubated, mechanically ventilated dogs: a light microscopic study (abstract). Anesthesiol 1986; 65:A490.
7. Klein EF Jr, Graves SA. "Hot pot" tracheitis. Chest 1974;65(2): 225-226.
8. International Organization for Standardization. ISO 8185, Section 7, Item 42.3.1-42.3.2, 1st ed, 1988.
9. Nemiroff MJ. Near-drowning. Respir Care 1992;37(6):600-608.
10. Harnett RM, Obrien EM, Sias FR, Pruitt JR. Initial treatment of profound accidental hypothermia. Aviat Space Environ Med 1980;51(7): 680-687.
11. Hayward JS, Steinman AM. Accidental hypothermia: An experimental study of inhalational rewarming. Aviat Space Environ Med 1975;46 (10):1236-1240.
12. Marcus P. Laboratory comparison of technique for rewarming hypothermic casualties. Aviat Space Environ Med 1978;49(5):692-697.
13. Morrison JB, Conn ML, Hayward JS. Accidental hypothermia: the effect of initial body temperatures and physique on the rate of rewarming. Aviat Space Environ Med 1980;51(10):1095-1099.
14. Pozos RS, Hesslink RL, Reading J et al. Rewarming methodologies in the field. AGARD Conference Proceedings 540. The support of air operations under extreme hot and cold weather conditions. 22.1-22.8, 1993.
15. Romet TT, Hoskins RW. Temperature and metabolic responses to inhalation and bath rewarming protocols. Aviat Space Environ Med 1988;59:630-634.
16. Sterba JA. Efficacy and safety of prehospital rewarming techniques to treat accidental hypothermia. Ann Emerg Med 1991;20(8):896-901.
17. Goheen MSL, Giesbrecht GG. Efficacy of forced air and inhalational rewarming using a human model for severe hypothermia. J Appl Physiol 1997 (in press).
18. Hynson JM, Sessler DI. Intraoperative warming therapies: a comparison of three devices. J Clin Anesth 1992;4(3):194-199.
19. Guild W. Rewarming via the airway (CBRW) for hypothermia in the field? J R Nav Med Serv 1978;64(3):186-193.
20. Morrison J, Conn M, Hayward J. Thermal increment provided by inhalational rewarming from hypothermia. J Appl Physiol 1979;46 (6):1061-1065.
21. Branson RD, Chatburn RL. Humidification of inspired gases during mechanical ventilation (editorial). Respir Care 1993;38(5):461-468.
22. Hudson M, Robinson G. Treatment of accidental hypothermia. Med J Australia 1973;19:410-411.
23. Morrison JB, Conn ML, Hayes PA. Influence of respiratory heat transfer on thermogenesis and heat storage after cold immersion. Clin Sci 1982;63(2):127-135.
24. Nemiroff M, Wallace W. Rewarming gas mixtures? (letter). Respir Care 1993 39(9):1029-1030.

Mr Wallace is associated with the Respiratory Care Department, Kodiak Island Hospital & Care Center, Kodiak, Alaska.

Reprint/Correspondence: Wayne Wallace BA RRT, Respiratory Care Department, Kodiak Island Hospital and Care Center, PO Box 564, Kodiak AK 99615.

What's with the Massive Hemoptysis?

Sarah J Jung RRT

Case Summary

An 18-year-old girl, who was a high school senior, was referred to our hospital because of massive hemoptysis (1-2 tablespoons at a time, 5-10 times throughout the day) during the previous 2 weeks. The patient's history revealed that the patient had mild scoliosis that had not needed repair, had undergone tympanotomy with tube insertion and adenoidectomy, had suffered recurrent pneumonia, and had a smoking record of less than 1 pack-year.

Physical examination revealed a normal-appearing young woman who was alert and oriented and appeared to be in no distress. The chest radiograph was considered abnormal, but no diagnostic conclusions could be drawn from it. A computerized tomography (CT) of the chest was ordered, and two views are shown in Figure 1.

Ms Jung is a respiratory therapist at Mayo Medical Center, Rochester, Minnesota.

Reprint or correspondence: Sarah J Jung RRT, Mayo Medical Center, Respiratory Therapy Dept, SMH G-403, Rochester MN 55905.

How would you answer these questions?

What abnormalities can be seen in the two CT views?

What are the possible causes for these abnormalities, given the patient's presenting complaint and past medical history?

What, if anything, should be done for this patient?

Answers & Discussion on Page 622

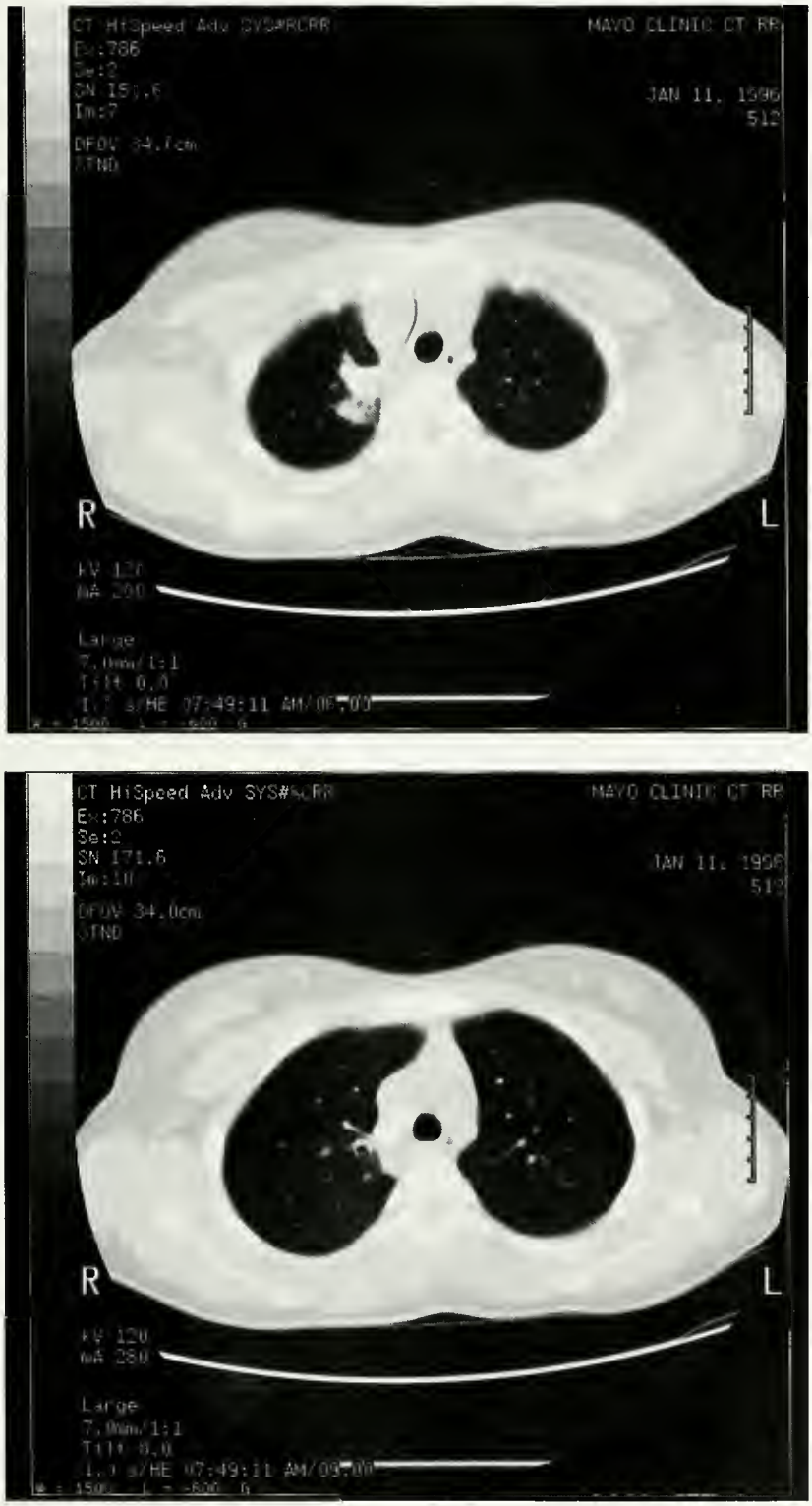


Fig. 1. Two views of computerized tomography scan from 18-year-old woman presenting with hemoptysis.

Answers

Tomographic Findings. The chest CT scan shows dense calcifications in the region of the right upper bronchus, with a right upper lobe broncholith, calcified lymph nodes, and right upper lobe collapse.

Etiology. Broncholithiasis, calcified or ossified material in the lumen of the tracheobronchial tree,[1] is due to tissue response to foreign material within the bronchus or erosion of calcified material, as from a granulomatous infection, into the airway.[2]

Further Diagnosis & Treatment. The patient underwent flexible fiberoptic bronchoscopy; and, based on the bronchoscopy findings, the recurrent hemoptysis, negative cultures and smears for *Histoplasma capsulatum* and *Mycobacterium tuberculosis* and the apparently long-standing atelectasis, a right thoracotomy with right upper lobectomy was performed.

Discussion

Broncholithiasis may be the consequence of the calcification of foreign material in the airway lumen,[3] the erosion of calcified peribronchial lymph nodes[2] or bronchial cartilage plates[2,3] into the lumen, or distortion of the tracheobronchial tree by such nodes.[2] In North America, the lymphadenitis associated with *H. capsulatum* is the mechanism most likely to give rise to calcified nodes. *M. tuberculosis* is another possible source. The only known noninfectious cause is silicosis.[4]

A common sign of broncholithiasis has been termed an "innocent hemoptysis" because of its low volume. However, recent reports have shown that massive hemoptysis secondary to broncholithiasis is more common than previously thought. This is due to the airway obstruction and bleeding that broncholiths can cause.[5] Chronic cough is another common symptom,[6] sometimes accompanied by the expectoration of the calcified material (lithoptysis).[3] The bronchial obstruction is occasionally accompanied by secondary infection with pain, chills, and fever[3] and can lead to atelectasis, pneumonia, and air trapping. Most patients with broncholiths appear normal on physical examination.

Differential diagnosis of broncholithiasis is usually accomplished through radiography, tomography, and bronchoscopy. Bronchoscopy is not as reliable as CT scan, being diagnostic in only 27-56% of reported cases.[6] However, bronchoscopy is useful in ruling out endobronchial neoplasms and other bronchial diseases.[4]

The pathologist's examination of the excised material revealed broncholithiasis with organizing pneumonia. Multiple intrapulmonary peribronchial lymph nodes were negative for malignancy and granulomas; lymph nodes associated with the right upper lobe bronchus revealed calcified necrotizing granulomas, and the hilar lymph nodes showed caseating granulomas. As mentioned previously, *M. tuberculosis* was ruled out by negative cultures.

On Postoperative Day 1, the patient's temperature rose to 39.9 °C and intravenous ceftazidime was prescribed. Manual chest percussion was ordered to aid in evacuation of secretions and any debris that might be present. Five days following surgery, the patient was discharged with instruction to take oral ciprofloxacin and clindamycin for 3 weeks and to continue the chest percussion. The prognosis for this patient is good and full recovery is expected.

Broncholithiasis is a difficult disorder to diagnose and may be present in an asymptomatic patient. When complications, such as bronchiectasis, atelectasis, or air trapping, or chronic cough or massive hemoptysis occur, surgical removal of the affected airway and communicating lobe is indicated. Postoperative pulmonary function tests suggest that airway obstruction is not likely to recur after the offending nodes and affected area are surgically removed.[4]

REFERENCES

1. McLean TR, Beall AC Jr, Jones JW. Massive hemoptysis due to broncholithiasis. Ann Thorac Surg 1991;52(5):1173-1175.
2. Conces DJ Jr, Tarver RD, Vix VA. Broncholithiasis: CT features in 15 patients. AJR Am R Roentgenol 1991;157(2):249-253.
3. Frase RS, Paré JAP, Fraser RG, Paré PD. Synopsis of diseases of the chest, 2nd edition. Philadelphia: WB Saunders 1994:687.
4. Scully RE, Mark EJ, McNeely BU. Case records of the Massachusetts General Hospital: Case 46-1991. N Engl J Med 1991;325:1429-1436.
5. Grenier P, Cordeau MP, Beigelman C. High resolution computed tomographies of the airways. J Thorac Imaging 1993;8(3):213-229.
6. Cahill BC, Harmon, KR, Shumway SJ, Mickman JK, Hertz MI. Tracheobronchial obstruction due to silicosis. Am Rev Respir Dis 1992;145(3):719-721.

Uniform Requirements for Manuscripts Submitted to Biomedical Journals

International Committee of Medical Journal Editors

A small group of editors of general medical journals met informally in Vancouver, British Columbia, in 1978 to establish guidelines for the format of manuscripts submitted to their journals. The group became known as the Vancouver Group. Its requirements for manuscripts, including formats for bibliographic references developed by the U.S. National Library of Medicine (NLM), were first published in 1979. The Vancouver Group expanded and evolved into the International Committee of Medical Journal Editors (ICMJE), which meets annually; gradually it has broadened its concerns.

The committee has produced five editions of the *Uniform Requirements for Manuscripts Submitted to Biomedical Journals*. Over the years, issues have arisen that go beyond manuscript preparation. Some of these issues are now covered in the *Uniform Requirements*; others are addressed in separate statements. Each statement has been published in a scientific journal.

The fifth edition (1997) is an effort to reorganize and reword the fourth edition to increase clarity and address concerns about rights, privacy, descriptions of methods, and other matters. The total content of the *Uniform Requirements for Manuscripts Submitted to Biomedical Journals* may be reproduced for educational, not-for-profit purposes without regard for copyright; the committee encourages distribution of the material.

Journals that agree to use the *Uniform Requirements* (over 500 do so) are asked to cite the 1997 document in their instructions to authors.

It is important to emphasize what these requirements do and do not imply.

First, the *Uniform Requirements* are instructions to authors on how to prepare manuscripts, not to editors on publication style. (But many journals have drawn on them for elements of their publication styles.)

Second, if authors prepare their manuscripts in the style specified in these requirements, editors of the participating journals will not return the manuscripts for changes in style before considering them for publication. In the publishing process, however, the journals may alter accepted manuscripts to conform with details of their publication style.

Third, authors sending manuscripts to a participating journal should not try to prepare them in accordance with the publication style of that journal but should follow the *Uniform Requirements*.

Authors must also follow the instructions to authors in the journal as to what topics are suitable for that journal and the types of papers that may be submitted—for example, original articles, reviews, or case reports. In addition, the journal's instructions are likely to contain other requirements unique to that journal, such as the number of copies of a manuscript that are required, acceptable languages, length of articles, and approved abbreviations.

Participating journals are expected to state in their instructions to authors that their requirements are in accordance with

Members of the International Committee of Medical Journal Editors: Linda Hawes Clever, *Western Journal of Medicine*; Lois Ann Colaianni, U.S. National Library of Medicine; Frank Davidoff, *Annals of Internal Medicine*; Richard Glass, *JAMA*; Richard Horton, *The Lancet*; George Lundberg, *JAMA*; Magne Nylenna, *Tidsskrift for Den Norske legeforening*; Richard G. Robinson, *New Zealand Medical Journal*; Richard Smith, *BMJ*; Bruce P. Squires, *Canadian Medical Association Journal*; Robert Utiger, *The New England Journal of Medicine*; Martin VanDer Weyden, *The Medical Journal of Australia*; and Patricia Woolf, Princeton University. Inquiries and comments should be sent to Kathleen Case at the ICMJE secretariat office, *Annals of Internal Medicine*, American College of Physicians, Independence Mall West, Sixth Street at Race, Philadelphia, PA 19106-1572, USA. Phone, 215-351-2661; fax, 215-351-2644; e-mail: Kathyc@mail.acponline.org

This document may be copied and distributed without charge for not-for-profit, educational purposes. A digital version is available on various web sites, including ACP Online (http://www.acponline.org). Rates for 10 or more reprints are available from the American College of Physicians Customer Service Department, phone, 215-351-2600; fax, 215-351-2448.

The Uniform Requirements has been published in several journals. Please cite a version that appeared in the primary journal literature on or after January 1, 1997.

the *Uniform Requirements for Manuscripts Submitted to Biomedical Journals* and to cite a published version.

Issues To Consider before Submitting a Manuscript

Redundant or Duplicate Publication

Redundant or duplicate publication is publication of a paper that overlaps substantially with one already published.

Readers of primary source periodicals deserve to be able to trust that what they are reading is original, unless there is a clear statement that the article is being republished by the choice of the author and editor. The bases of this position are international copyright laws, ethical conduct, and cost-effective use of resources.

Most journals do not wish to receive papers on work that has already been reported in large part in a published article or is contained in another paper that has been submitted or accepted for publication elsewhere, in print or in electronic media. This policy does not preclude the journal considering a paper that has been rejected by another journal, or a complete report that follows publication of a preliminary report, such as an abstract or poster displayed for colleagues at a professional meeting. Nor does it prevent journals considering a paper that has been presented at a scientific meeting but not published in full or that is being considered for publication in a proceedings or similar format. Press reports of scheduled meetings will not usually be regarded as breaches of this rule, but such reports should not be amplified by additional data or copies of tables and illustrations.

When submitting a paper, the author should always make a full statement to the editor about all submissions and previous reports that might be regarded as redundant or duplicate publication of the same or very similar work. The author should alert the editor if the work includes subjects about which a previous report has been published. Any such work should be referred to and referenced in the new paper. Copies of such material should be included with the submitted paper to help the editor decide how to handle the matter.

If redundant or duplicate publication is attempted or occurs without such notification, authors should expect editorial action to be taken. At the least, prompt rejection of the submitted manuscript should be expected. If the editor was not aware of the violations, and the article has already been published, then a notice of redundant or duplicate publication will probably be published with or without the author's explanation or approval.

Preliminary release, usually to public media, of scientific information described in a paper that has been accepted but not yet published violates the policies of many journals. In a few cases, and only by arrangement with the editor, preliminary release of data may be acceptable—for example, if there is a public health emergency.

Acceptable Secondary Publication

Secondary publication in the same or another language, especially in other countries, is justifiable, and can be beneficial, provided all of the following conditions are met.

1. The authors have received approval from the editors of both journals; the editor concerned with secondary publication must have a photocopy, reprint, or manuscript of the primary version.
2. The priority of the primary publication is respected by a publication interval of at least one week (unless specifically negotiated otherwise by both editors).
3. The paper for secondary publication is intended for a different group of readers; an abbreviated version could be sufficient.
4. The secondary version faithfully reflects the data and interpretations of the primary version.
5. The footnote on the title page of the secondary version informs readers, peers, and documenting agencies that the paper has been published in whole or in part and states the primary reference. A suitable footnote might read: "This article is based on a study first reported in the [title of journal, with full reference]."

Permission for such secondary publication should be free of charge.

Protection of Patients' Rights to Privacy

Patients have a right to privacy that should not be infringed without informed consent. Identifying information should not be published in written descriptions, photographs, and pedigrees unless the information is essential for scientific purposes and the patient (or parent or guardian) gives written informed consent for publication. Informed consent for this purpose requires that the patient be shown the manuscript to be published.

Identifying details should be omitted if they are not essential, but patient data should never be altered or falsified in an attempt to attain anonymity. Complete anonymity is difficult to achieve, and informed consent should be obtained if there is any doubt. For example, masking the eye region in photographs of patients is inadequate protection of anonymity.

The requirement for informed consent should be included in the journal's instructions for authors. When informed consent has been obtained it should be indicated in the published article.

Requirements for Submission of Manuscripts

Summary of Technical Requirements

- Double space all parts of manuscripts.
- Begin each section or component on a new page.

- Review the sequence: title page, abstract and key words, text, acknowledgments, references, tables (each on separate page), legends.
- Illustrations, unmounted prints, should be no larger than 203 × 254 mm (8 × 10 in.).
- Include permission to reproduce previously published material or to use illustrations that may identify human subjects.
- Enclose transfer of copyright and other forms.
- Submit the required number of paper copies.
- Keep copies of everything submitted.

Preparation of Manuscript

The text of observational and experimental articles is usually (but not necessarily) divided into sections with the headings Introduction, Methods, Results, and Discussion. Long articles may need subheadings within some sections (especially the Results and Discussion sections) to clarify their content. Other types of articles, such as case reports, reviews, and editorials, are likely to need other formats. Authors should consult individual journals for further guidance.

Type or print out the manuscript on white bond paper, 216 × 279 mm (8.5 × 11 in.), or ISO A4 (212 × 297 mm), with margins of at least 25 mm (1 in.). Type or print on only one side of the paper. Use double spacing throughout, including for the title page, abstract, text, acknowledgments, references, individual tables, and legends. Number pages consecutively, beginning with the title page. Put the page number in the upper or lower right-hand corner of each page.

Manuscripts on Disks

For papers that are close to final acceptance, some journals require authors to provide a copy in electronic form (on a disk); they may accept a variety of word-processing formats or text (ASCII) files.

When submitting disks, authors should:

1. be certain to include a print-out of the version of the article that is on the disk;
2. put only the latest version of the manuscript on the disk;
3. name the file clearly;
4. label the disk with the format of the file and the file name;
5. provide information on the hardware and software used.

Authors should consult the journal's instructions to authors for acceptable formats, conventions for naming files, number of copies to be submitted, and other details.

Title Page

The title page should carry (1) the title of the article, which should be concise but informative; (2) the name by which each author is known, with his or her highest academic degree(s) and institutional affiliation; (3) the name of the department(s) and institution(s) to which the work should be attributed; (4) disclaimers, if any; (5) the name and address of the author responsible for correspondence about the manuscript; (6) the name and address of the author to whom requests for reprints should be addressed or a statement that reprints will not be available from the authors; (7) source(s) of support in the form of grants, equipment, drugs, or all of these; and (8) a short running head or footline of no more than 40 characters (count letters and spaces) at the foot of the title page.

Authorship

All persons designated as authors should qualify for authorship. Each author should have participated sufficiently in the work to take public responsibility for the content.

Authorship credit should be based only on substantial contributions to (1) conception and design, or analysis and interpretation of data; and to (2) drafting the article or revising it critically for important intellectual content; and on (3) final approval of the version to be published. Conditions 1, 2, and 3 must all be met. Participation solely in the acquisition of funding or the collection of data does not justify authorship. General supervision of the research group is not sufficient for authorship. Any part of an article critical to its main conclusions must be the responsibility of at least one author. Editors may ask authors to describe what each contributed; this information may be published.

Increasingly, multicenter trials are attributed to a corporate author. All members of the group who are named as authors, either in the authorship position below the title or in a footnote, should fully meet the above criteria for authorship. Group members who do not meet these criteria should be listed, with their permission, in the Acknowledgments or in an appendix (see Acknowledgments).

The order of authorship should be a joint decision of the coauthors. Because the order is assigned in different ways, its meaning cannot be inferred accurately unless it is stated by the authors. Authors may wish to explain the order of authorship in a footnote. In deciding on the order, authors should be aware that many journals limit the number of authors listed in the table of contents and that the U.S. National Library of Medicine lists in MEDLINE only the first 24 plus the last author when there are more than 25 authors.

Abstract & Key Words

The second page should carry an abstract (of no more than 150 words for unstructured abstracts or 250 words for structured abstracts). The abstract should state the purposes of the study or investigation, basic procedures (selection of study subjects or laboratory animals, observational and analytical methods), main findings (giving specific data and their statistical significance, if possible), and the principal conclusions.

It should emphasize new and important aspects of the study or observations.

Below the abstract authors should provide, and identify as such, 3 to 10 key words or short phrases that will assist indexers in cross-indexing the article and may be published with the abstract. Terms from the Medical Subject Headings (MeSH) list of Index Medicus should be used; if suitable MeSH terms are not yet available for recently introduced terms, present terms may be used.

Introduction

State the purpose of the article and summarize the rationale for the study or observation. Give only strictly pertinent references and do not include data or conclusions from the work being reported.

Methods

Describe your selection of the observational or experimental subjects (patients or laboratory animals, including controls) clearly. Identify the age, sex, and other important characteristics of the subjects. The definition and relevance of race and ethnicity are ambiguous. Authors should be particularly careful about using these categories.

Identify the methods, apparatus (give the manufacturer's name and address in parentheses), and procedures in sufficient detail to allow other workers to reproduce the results. Give references to established methods, including statistical methods (see below); provide references and brief descriptions for methods that have been published but are not well known; describe new or substantially modified methods, give reasons for using them, and evaluate their limitations. Identify precisely all drugs and chemicals used, including generic name(s), dose(s), and route(s) of administration.

Reports of randomized clinical trials should present information on all major study elements, including the protocol (study population, interventions or exposures, outcomes, and the rationale for statistical analysis), assignment of interventions (methods of randomization, concealment of allocation to treatment groups), and the method of masking (blinding).

Authors submitting review manuscripts should include a section describing the methods used for locating, selecting, extracting, and synthesizing data. These methods should also be summarized in the abstract.

Ethics

When reporting experiments on human subjects, indicate whether the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 1983. Do not use patients' names, initials, or hospital numbers, especially in illustrative material. When reporting experiments on animals, indicate whether the institution's or a national research council's guide for, or any national law on, the care and use of laboratory animals was followed.

Statistics

Describe statistical methods with enough detail to enable a knowledgeable reader with access to the original data to verify the reported results. When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals). Avoid relying solely on statistical hypothesis testing, such as the use of p values, which fails to convey important quantitative information. Discuss the eligibility of experimental subjects. Give details about randomization. Describe the methods for and success of any blinding of observations. Report complications of treatment. Give numbers of observations. Report losses to observation (such as dropouts from a clinical trial). References for the design of the study and statistical methods should be to standard works when possible (with pages stated) rather than to papers in which the designs or methods were originally reported. Specify any general-use computer programs used.

Put a general description of methods in the Methods section. When data are summarized in the Results section, specify the statistical methods used to analyze them. Restrict tables and figures to those needed to explain the argument of the paper and to assess its support. Use graphs as an alternative to tables with many entries; do not duplicate data in graphs and tables. Avoid nontechnical uses of technical terms in statistics, such as "random" (which implies a randomizing device), "normal," "significant," "correlations," and "sample." Define statistical terms, abbreviations, and most symbols.

Results

Present your results in logical sequence in the text, tables, and illustrations. Do not repeat in the text all the data in the tables or illustrations; emphasize or summarize only important observations.

Discussion

Emphasize the new and important aspects of the study and the conclusions that follow from them. Do not repeat in detail data or other material given in the Introduction or the Results section. Include in the Discussion section the implications of the findings and their limitations, including implications for future research. Relate the observations to other relevant studies.

Link the conclusions with the goals of the study but avoid unqualified statements and conclusions not completely supported by the data. In particular, authors should avoid mak-

ing statements on economic benefits and costs unless their manuscript includes economic data and analyses. Avoid claiming priority and alluding to work that has not been completed. State new hypotheses when warranted, but clearly label them as such. Recommendations, when appropriate, may be included.

Acknowledgments

At an appropriate place in the article (the title-page footnote or an appendix to the text; see the journal's requirements), one or more statements should specify (1) contributions that need acknowledging but do not justify authorship, such as general support by a departmental chair; (2) acknowledgments of technical help; (3) acknowledgments of financial and material support, which should specify the nature of the support; and (4) relationships that may pose a conflict of interest (see Conflict of Interest).

Persons who have contributed intellectually to the paper but whose contributions do not justify authorship may be named and their function or contribution described-for example, "scientific adviser," "critical review of study proposal," "data collection," or "participation in clinical trial." Such persons must have given their permission to be named. Authors are responsible for obtaining written permission from persons acknowledged by name because readers may infer their endorsement of the data and conclusions.

Technical help should be acknowledged in a paragraph separate from that acknowledging other contributions.

References

References should be numbered consecutively in the order in which they are first mentioned in the text. Identify references in text, tables, and legends by Arabic numerals in parentheses. References cited only in tables or figure legends should be numbered in accordance with the sequence established by the first identification in the text of the particular table or figure.

Use the style of the examples below, which are based on the formats used by the U.S. National Library of Medicine in *Index Medicus*. The titles of journals should be abbreviated according to the style used in *Index Medicus*. Consult the *List of Journals Indexed in Index Medicus*, published annually as a separate publication by the library and as a list in the January issue of *Index Medicus*. The list can also be obtained through the Library's web site (http://www.nlm.nih.gov).

Avoid using abstracts as references. References to papers accepted but not yet published should be designated as "in press" or "forthcoming"; authors should obtain written permission to cite such papers as well as verification that they have been accepted for publication. Information from manuscripts submitted but not accepted should be cited in the text as "unpublished observations" with written permission from the source.

Avoid citing a "personal communication" unless it provides essential information not available from a public source, in which case the name of the person and date of communication should be cited in parentheses in the text. For scientific articles, authors should obtain written permission and confirmation of accuracy from the source of a personal communication.

The references must be verified by the author(s) against the original documents. The *Uniform Requirements* style (the Vancouver style) is based largely on an American National Standards Institute (ANSI) standard style adapted by the NLM for its databases. Notes have been added where Vancouver style differs from the style now used by NLM.

Articles in Journals

1. Standard journal article

List the first six authors followed by et al. (Note: NLM now lists up through 25 authors; if there are more than 25 authors, NLM lists the first 24, then the last author, then et al.)

> Vega KJ, Pina I, Krevsky B. Heart transplantation is associated with an increased risk for pancreaticobiliary disease. Ann Intern Med 1996 Jun 1;124 (11):980-3.

As an option, if a journal carries continuous pagination throughout a volume (as many medical journals do) the month and issue number may be omitted.

(Note: For consistency, the option is used throughout the examples in *Uniform Requirements*. NLM does not use the option.)

> Vega KJ, Pina I, Krevsky B. Heart transplantation is associated with an increased risk for pancreaticobiliary disease. Ann Intern Med 1996;124:980-3.

More than six authors

> Parkin DM, Clayton D, Black RJ, Masuyer E, Friedl HP, Ivanov E, et al. Childhood leukaemia in Europe after Chernobyl: 5 year follow-up. Br J Cancer 1996;73:1006-12.

2. Organization as author

> The Cardiac Society of Australia and New Zealand. Clinical exercise stress testing. Safety and performance guidelines. Med J Aust 1996; 164: 282-4.

3. No author given

> Cancer in South Africa [editorial]. S Afr Med J 1994;84:15.

4. Article not in English

(Note: NLM translates the title to English, encloses the translation in square brackets, and adds an abbreviated language designator.)

Ryder TE, Haukeland EA, Solhaug JH. Bilateral infrapatellar seneruptur hostidligere frisk kvinne. Tidsskr Nor Laegeforen 1996;116:41-2.

5. Volume with supplement

Shen HM, Zhang QF. Risk assessment of nickel carcinogenicity and occupational lung cancer. Environ Health Perspect 1994;102 Suppl 1:275-82.

6. Issue with supplement

Payne DK, Sullivan MD, Massie MJ. Women's psychological reactions to breast cancer. Semin Oncol 1996;23(1 Suppl 2):89-97.

7. Volume with part

Ozben T, Nacitarhan S, Tuncer N. Plasma and urine sialic acid in non-insulin dependent diabetes mellitus. Ann Clin Biochem 1995;32(Pt 3):303-6.

8. Issue with part

Poole GH, Mills SM. One hundred consecutive cases of flap lacerations of the leg in ageing patients. N Z Med J 1994;107(986 Pt 1):377-8.

9. Issue with no volume

Turan I, Wredmark T, Fellander-Tsai L. Arthroscopic ankle arthrodesis in rheumatoid arthritis. Clin Orthop 1995;(320):110-4.

10. No issue or volume

Browell DA, Lennard TW. Immunologic status of the cancer patient and the effects of blood transfusion on antitumor responses. Curr Opin Gen Surg 1993:325-33.

11. Pagination in Roman numerals

Fisher GA, Sikic BI. Drug resistance in clinical oncology and hematology. Introduction. Hematol Oncol Clin North Am 1995 Apr;9(2):xi-xii.

12. Type of article indicated as needed

Enzensberger W, Fischer PA. Metronome in Parkinson's disease [letter]. Lancet 1996;347:1337.

Clement J, De Bock R. Hematological complications of hantavirus nephropathy (HVN) [abstract]. Kidney Int 1992;42:1285.

13. Article containing retraction

Garey CE, Schwarzman AL, Rise ML, Seyfried TN. Ceruloplasmin gene defect associated with epilepsy in EL mice [retraction of Garey CE, Schwarzman AL, Rise ML, Seyfried TN. In: Nat Genet 1994;6:426-31]. Nat Genet 1995;11:104.

14. Article retracted

Liou GI, Wang M, Matragoon S. Precocious IRBP gene expression during mouse development [retracted in Invest Ophthalmol Vis Sci 1994;35:3127]. Invest Ophthalmol Vis Sci 1994;35:1083-8.

15. Article with published erratum

Hamlin JA, Kahn AM. Herniography in symptomatic patients following inguinal hernia repair [published erratum appears in West J Med 1995;162:278]. West J Med 1995;162:28-31.

Books & Other Monographs

(Note: Previous Vancouver style incorrectly had a comma rather than a semicolon between the publisher and the date.)

16. Personal author(s)

Ringsven MK, Bond D. Gerontology and leadership skills for nurses. 2nd ed. Albany (NY): Delmar Publishers; 1996.

17. Editor(s), compiler(s) as author

Norman IJ, Redfern SJ, editors. Mental health care for elderly people. New York: Churchill Livingstone; 1996.

18. Organization as author and publisher

Institute of Medicine (US). Looking at the future of the Medicaid program. Washington: The Institute; 1992.

19. Chapter in a book

(Note: Previous Vancouver style had a colon rather than a p before pagination.)

Phillips SJ, Whisnant JP. Hypertension and stroke. In: Laragh JH, Brenner BM, editors. Hypertension: pathophysiology, diagnosis, and management. 2nd ed. New York: Raven Press; 1995. p. 465-78.

20. Conference proceedings

Kimura J, Shibasaki H, editors. Recent advances in clinical neurophysiology. Proceedings of the 10th International Congress of EMG and Clinical Neurophysiology; 1995 Oct 15-19; Kyoto, Japan. Amsterdam: Elsevier; 1996.

21. Conference paper

Bengtsson S, Solheim BG. Enforcement of data protection, privacy and security in medical informatics. In: Lun KC, Degoulet P, Piemme TE, Rienhoff O, editors. MEDINFO 92. Proceedings of the 7th World Congress on Medical Informatics; 1992 Sep 6-10; Geneva, Switzerland. Amsterdam: North-Holland; 1992. p. 1561-5.

22. Scientific or technical report

Issued by funding/sponsoring agency

Smith P, Golladay K. Payment for durable medical equipment billed during skilled nursing facility stays. Final report. Dallas (TX): Dept. of Health and Human Services (US), Office of Evaluation and Inspections; 1994 Oct. Report No.: HHSIGOEI69200860.

Issued by performing agency

Field MJ, Tranquada RE, Feasley JC, editors. Health services research: work force and educational issues. Washington: National Academy Press; 1995. Contract No.: AHCPR282942008. Sponsored by the Agency for Health Care Policy and Research.

23. Dissertation

Kaplan SJ. Post-hospital home health care: the elderly's access and utilization [dissertation]. St. Louis (MO): Washington Univ.; 1995.

24. Patent

Larsen CE, Trip R, Johnson CR, inventors; Novoste Corporation, assignee. Methods for procedures related to the electrophysiology of the heart. US patent 5,529,067. 1995 Jun 25.

Other Published Material

25. Newspaper article

Lee G. Hospitalizations tied to ozone pollution: study estimates 50,000 admissions annually. The Washington Post 1996 Jun 21;Sect. A:3 (col. 5).

26. Audiovisual material

HIV+/AIDS: the facts and the future [videocassette]. St. Louis (MO): Mosby-Year Book; 1995.

27. Legal material

Public law

Preventive Health Amendments of 1993, Pub. L. No. 103-183, 107 Stat. 2226 (Dec. 14, 1993).

Unenacted bill

Medical Records Confidentiality Act of 1995, S. 1360, 104th Cong., 1st Sess. (1995).

Code of Federal Regulations

Informed Consent, 42 C.F.R. Sect. 441.257 (1995).

Hearing

Increased Drug Abuse: the Impact on the Nation's Emergency Rooms: Hearings Before the Subcomm. on Human Resources and Intergovernmental Relations of the House Comm. on Government Operations, 103rd Cong., 1st Sess. (May 26, 1993).

28. Map

North Carolina. Tuberculosis rates per 100,000 population, 1990 [demographic map]. Raleigh: North Carolina Dept. of Environment, Health, and Natural Resources, Div. of Epidemiology; 1991.

29. Book of the Bible

The Holy Bible. King James version. Grand Rapids (MI): Zondervan Publishing House; 1995. Ruth 3:1-18.

30. Dictionary and similar references

Stedman's medical dictionary. 26th ed. Baltimore: Williams & Wilkins; 1995. Apraxia; p. 119-20.

31. Classical material

The Winter's Tale: act 5, scene 1, lines 13-16. The complete works of William Shakespeare. London: Rex; 1973.

Unpublished Material

32. In press

(Note: NLM prefers "forthcoming" because not all items will be printed.)

Leshner AI. Molecular mechanisms of cocaine addiction. N Engl J Med. In press 1996.

Electronic Material

33. Journal article in electronic format

Morse SS. Factors in the emergence of infectious diseases. Emerg Infect Dis [serial online] 1995 Jan-Mar [cited 1996 Jun 5];1(1):[24 screens]. Available from: URL: http://www.cdc.gov/ncidod/EID/eid.htm

34. Monograph in electronic format

CDI, clinical dermatology illustrated [monograph on CD-ROM]. Reeves JRT, Maibach H. CMEA Multimedia Group, producers. 2nd ed. Version 2.0. San Diego: CMEA; 1995.

35. Computer file

> Hemodynamics III: the ups and downs of hemodynamics [computer program]. Version 2.2. Orlando (FL): Computerized Educational Systems; 1993.

Tables

Type or print out each table with double spacing on a separate sheet of paper. Do not submit tables as photographs. Number tables consecutively in the order of their first citation in the text and supply a brief title for each. Give each column a short or abbreviated heading. Place explanatory matter in footnotes, not in the heading. Explain in footnotes all nonstandard abbreviations that are used in each table. For footnotes use the following symbols, in this sequence: *, †, ‡, §, ‖, ¶, **, ††, ‡‡, etc.

- Identify statistical measures of variations, such as standard deviation and standard error of the mean.
- Do not use internal horizontal and vertical rules.
- Be sure that each table is cited in the text.
- If you use data from another published or unpublished source, obtain permission and acknowledge them fully.

The use of too many tables in relation to the length of the text may produce difficulties in the layout of pages. Examine issues of the journal to which you plan to submit your paper to estimate how many tables can be used per 1000 words of text.

The editor, on accepting a paper, may recommend that additional tables containing important backup data too extensive to publish be deposited with an archival service, such as the National Auxiliary Publication Service in the United States, or made available by the authors. In that event, an appropriate statement will be added to the text. Submit such tables for consideration with the paper.

Illustrations (Figures)

Submit the required number of complete sets of figures. Figures should be professionally drawn and photographed; freehand or typewritten lettering is unacceptable. Instead of original drawings, x-ray films, and other material, send sharp, glossy, black-and-white photographic prints, usually 127 × 173 mm (5 × 7 in.) but no larger than 203 × 254 mm (8 × 10 in.). Letters, numbers, and symbols should be clear and even throughout and of sufficient size that when reduced for publication each item will still be legible. Titles and detailed explanations belong in the legends for illustrations not on the illustrations themselves.

Each figure should have a label pasted on its back indicating the number of the figure, author's name, and top of the figure. Do not write on the back of figures or scratch or mar them by using paper clips. Do not bend figures or mount them on cardboard.

Photomicrographs should have internal scale markers. Symbols, arrows, or letters used in photomicrographs should contrast with the background.

If photographs of people are used, either the subjects must not be identifiable or their pictures must be accompanied by written permission to use the photograph (see Protection of Patients' Rights to Privacy).

Figures should be numbered consecutively according to the order in which they have been first cited in the text. If a figure has been published, acknowledge the original source and submit written permission from the copyright holder to reproduce the material. Permission is required irrespective of authorship or publisher except for documents in the public domain.

For illustrations in color, ascertain whether the journal requires color negatives, positive transparencies, or color prints. Accompanying drawings marked to indicate the region to be reproduced may be useful to the editor. Some journals publish illustrations in color only if the author pays for the extra cost.

Legends for Illustrations

Type or print out legends for illustrations using double spacing, starting on a separate page, with Arabic numerals corresponding to the illustrations. When symbols, arrows, numbers, or letters are used to identify parts of the illustrations, identify and explain each one clearly in the legend. Explain the internal scale and identify the method of staining in photomicrographs.

Units of Measurement

Measurements of length, height, weight, and volume should be reported in metric units (meter, kilogram, or liter) or their decimal multiples.

Temperatures should be given in degrees Celsius. Blood pressures should be given in millimeters of mercury.

All hematologic and clinical chemistry measurements should be reported in the metric system in terms of the International System of Units (SI). Editors may request that alternative or non-SI units be added by the authors before publication.

Abbreviations & Symbols

Use only standard abbreviations. Avoid abbreviations in the title and abstract. The full term for which an abbreviation stands should precede its first use in the text unless it is a standard unit of measurement.

Sending the Manuscript to the Journal

Send the required number of copies of the manuscript in a heavy-paper envelope, enclosing the copies and figures in

cardboard, if necessary, to prevent the photographs from being bent. Place photographs and transparencies in a separate heavy-paper envelope.

Manuscripts must be accompanied by a covering letter signed by all coauthors. This must include (1) information on prior or duplicate publication or submission elsewhere of any part of the work as defined earlier in this document; (2) a statement of financial or other relationships that might lead to a conflict of interest (see below); (3) a statement that the manuscript has been read and approved by all the authors, that the requirements for authorship as stated earlier in this document have been met, and that each author believes that the manuscript represents honest work; and (4) the name, address, and telephone number of the corresponding author, who is responsible for communicating with the other authors about revisions and final approval of the proofs. The letter should give any additional information that may be helpful to the editor, such as the type of article in the particular journal that the manuscript represents and whether the author(s) would be willing to meet the cost of reproducing color illustrations.

The manuscript must be accompanied by copies of any permissions to reproduce published material, to use illustrations or report information about identifiable people, or to name people for their contributions.

Separate Statements

Definition of a Peer-Reviewed Journal

A peer-reviewed journal is one that has submitted most of its published articles for review by experts who are not part of the editorial staff. The number and kind of manuscripts sent for review, the number of reviewers, the reviewing procedures, and the use made of the reviewers' opinions may vary, and therefore each journal should publicly disclose its policies in its instructions to authors for the benefit of readers and potential authors.

Editorial Freedom & Integrity

Owners and editors of medical journals have a common endeavor—the publication of a reliable and readable journal, produced with due respect for the stated aims of the journal and for costs. The functions of owners and editors, however, are different. Owners have the right to appoint and dismiss editors and to make important business decisions in which editors should be involved to the fullest extent possible. Editors must have full authority for determining the editorial content of the journal. This concept of editorial freedom should be resolutely defended by editors even to the extent of their placing their positions at stake. To secure this freedom in practice, the editor should have direct access to the highest level of ownership, not only to a delegated manager.

Editors of medical journals should have a contract that clearly states the editor's rights and duties in addition to the general terms of the appointment and that defines mechanisms for resolving conflict.

An independent editorial advisory board may be useful in helping the editor establish and maintain editorial policy.

All editors and editors' organizations have the obligation to support the concept of editorial freedom and to draw major transgressions of such freedom to the attention of the international medical community.

Conflict of Interest

Conflict of interest for a given manuscript exists when a participant in the peer review and publication process—author, reviewer, and editor—has ties to activities that could inappropriately influence his or her judgment, whether or not judgment is in fact affected. Financial relationships with industry (for example, through employment, consultancies, stock ownership, honoraria, expert testimony), either directly or through immediate family, are usually considered to be the most important conflicts of interest. However, conflicts can occur for other reasons, such as personal relationships, academic competition, and intellectual passion.

Public trust in the peer review process and the credibility of published articles depend in part on how well conflict of interest is handled during writing, peer review, and editorial decision making. Bias can often be identified and eliminated by careful attention to the scientific methods and conclusions of the work. Financial relationships and their effects are less easily detected than other conflicts of interest. Participants in peer review and publication should disclose their conflicting interests, and the information should be made available so that others can judge their effects for themselves. Because readers may be less able to detect bias in review articles and editorials than in reports of original research, some journals do not accept reviews and editorials from authors with a conflict of interest.

Authors. When they submit a manuscript, whether an article or a letter, authors are responsible for recognizing and disclosing financial and other conflicts of interest that might bias their work. They should acknowledge in the manuscript all financial support for the work and other financial or personal connections to the work.

Reviewers. External peer reviewers should disclose to editors any conflicts of interest that could bias their opinions of the manuscript, and they should disqualify themselves from reviewing specific manuscripts if they believe it to be appropriate. The editors must be made aware of reviewers' conflicts of interest to interpret the reviews and judge for themselves whether the reviewer should be disqualified. Reviewers should not use knowledge of the work, before its publication, to further their own interests.

Editors & Staff. Editors who make final decisions about manuscripts should have no personal financial involvement in any of the issues they might judge. Other members of the editorial staff, if they participate in editorial decisions, should provide editors with a current description of their financial interests (as they might relate to editorial judgments) and disqualify themselves from any decisions where they have a conflict of interest. Published articles and letters should include a description of all financial support and any conflict of interest that, in the editors' judgment, readers should know about. Editorial staff should not use the information gained through working with manuscripts for private gain.

Corrections, Retractions, & 'Expressions of Concern' about Research Findings

Editors must assume initially that authors are reporting work based on honest observations. Nevertheless, two types of difficulty may arise.

First, errors may be noted in published articles that require the publication of a correction or erratum of part of the work. It is conceivable that an error could be so serious as to vitiate the entire body of the work, but this is unlikely and should be handled by editors and authors on an individual basis. Such an error should not be confused with inadequacies exposed by the emergence of new scientific information in the normal course of research. The latter require no corrections or withdrawals.

The second type of difficulty is scientific fraud. If substantial doubts arise about the honesty of work, either submitted or published, it is the editor's responsibility to ensure that the question is appropriately pursued (including possible consultation with the authors). However, it is not the task of editors to conduct a full investigation or to make a determination; that responsibility lies with the institution where the work was done or with the funding agency. The editor should be promptly informed of the final decision, and if a fraudulent paper has been published, the journal must print a retraction. If this method of investigation does not result in a satisfactory conclusion, the editor may choose to publish an expression of concern with an explanation.

The retraction or expression of concern, so labeled, should appear on a numbered page in a prominent section of the journal, be listed in the contents page, and include in its heading the title of the original article. It should not simply be a letter to the editor. Ideally, the first author should be the same in the retraction as in the article, although under certain circumstances the editor may accept retractions by other responsible people. The text of the retraction should explain why the article is being retracted and include a bibliographic reference to it.

The validity of previous work by the author of a fraudulent paper cannot be assumed. Editors may ask the author's institution to assure them of the validity of earlier work published in their journals or to retract it. If this is not done they may choose to publish an announcement to the effect that the validity of previously published work is not assured.

Confidentiality

Manuscripts should be reviewed with due respect for authors' confidentiality. In submitting their manuscripts for review, authors entrust editors with the results of their scientific work and creative effort, on which their reputation and career may depend. Authors' rights may be violated by disclosure of the confidential details of the review of their manuscript. Reviewers also have rights to confidentiality, which must be respected by the editor. Confidentiality may have to be breached if dishonesty or fraud is alleged but otherwise must be honored.

Editors should not disclose information about manuscripts (including their receipt, their content, their status in the reviewing process, their criticism by reviewers, or their ultimate fate) to anyone other than the authors themselves and reviewers.

Editors should make clear to their reviewers that manuscripts sent for review are privileged communications and are the private property of the authors. Therefore, reviewers and members of the editorial staff should respect the authors' rights by not publicly discussing the authors' work or appropriating their ideas before the manuscript is published. Reviewers should not be allowed to make copies of the manuscript for their files and should be prohibited from sharing it with others, except with the permission of the editor. Editors should not keep copies of rejected manuscripts.

Opinions differ on whether reviewers should remain anonymous. Some editors require their reviewers to sign the comments returned to authors, but most either request that reviewers' comments not be signed or leave the choice to the reviewer. When comments are not signed the reviewers' identity must not be revealed to the author or anyone else.

Some journals publish reviewers' comments with the manuscript. No such procedure should be adopted without the consent of the authors and reviewers. However, reviewers' comments may be sent to other reviewers of the same manuscript, and reviewers may be notified of the editor's decision.

Medical Journals & the Popular Media

The public's interest in news of medical research has led the popular media to compete vigorously to get information about research as soon as possible. Researchers and institutions sometimes encourage the reporting of research in the popular media before full publication in a scientific journal by holding a press conference or giving interviews.

The public is entitled to important medical information without unreasonable delay, and editors have a responsibility to play their part in this process. Doctors, however, need to have reports available in full detail before they can advise their

patients about the reports' conclusions. In addition, media reports of scientific research before the work has been peer reviewed and fully published may lead to the dissemination of inaccurate or premature conclusions.

Editors may find the following recommendations useful as they seek to establish policies on these issues.

1. Editors can foster the orderly transmission of medical information from researchers, through peer-reviewed journals, to the public. This can be accomplished by an agreement with authors that they will not publicize their work while their manuscript is under consideration or awaiting publication and an agreement with the media that they will not release stories before publication in the journal, in return for which the journal will cooperate with them in preparing accurate stories (see below).

2. Very little medical research has such clear and urgently important clinical implications for the public's health that the news must be released before full publication in a journal. In such exceptional circumstances, however, appropriate authorities responsible for public health should make the decision and should be responsible for the advance dissemination of information to physicians and the media. If the author and the appropriate authorities wish to have a manuscript considered by a particular journal, the editor should be consulted before any public release. If editors accept the need for immediate release, they should waive their policies limiting prepublication publicity.

3. Policies designed to limit prepublication publicity should not apply to accounts in the media of presentations at scientific meetings or to the abstracts from these meetings (see Redundant or Duplicate Publication). Researchers who present their work at a scientific meeting should feel free to discuss their presentations with reporters, but they should be discouraged from offering more detail about their study than was presented in their talk.

4. When an article is soon to be published, editors may wish to help the media prepare accurate reports by providing news releases, answering questions, supplying advance copies of the journal, or referring reporters to the appropriate experts. This assistance should be contingent on the media's cooperation in timing their release of stories to coincide with the publication of the article.

Advertising

Most medical journals carry advertising, which generates income for their publishers, but advertising must not be allowed to influence editorial decisions. Editors must have full responsibility for advertising policy. Readers should be able to distinguish readily between advertising and editorial material. The juxtaposition of editorial and advertising material on the same products or subjects should be avoided, and advertising should not be sold on the condition that it will appear in the same issue as a particular article.

Journals should not be dominated by advertising, but editors should be careful about publishing advertisements from only one or two advertisers as readers may perceive that the editor has been influenced by these advertisers.

Journals should not carry advertisements for products that have proved to be seriously harmful to health—for example, tobacco. Editors should ensure that existing standards for advertisements are enforced or develop their own standards. Finally, editors should consider all criticisms of advertisements for publication.

Supplements

Supplements are collections of papers that deal with related issues or topics, are published as a separate issue of the journal or as a second part of a regular issue, and are usually funded by sources other than the journal's publisher. Supplements can serve useful purposes: education, exchange of research information, ease of access to focused content, and improved cooperation between academic and corporate entities. Because of the funding sources, the content of supplements can reflect biases in choice of topics and viewpoints. Editors should therefore consider the following principles.

1. The journal editor must take full responsibility for the policies, practices, and content of supplements. The journal editor must approve the appointment of any editor of the supplement and retain the authority to reject papers.

2. The sources of funding for the research, meeting, and publication should be clearly stated and prominently located in the supplement, preferably on each page. Whenever possible, funding should come from more than one sponsor.

3. Advertising in supplements should follow the same policies as those of the rest of the journal.

4. Editors should enable readers to distinguish readily between ordinary editorial pages and supplement pages.

5. Editing by the funding organization should not be permitted.

6. Journal editors and supplement editors should not accept personal favors or excessive compensation from sponsors of supplements.

7. Secondary publication in supplements should be clearly identified by the citation of the original paper. Redundant publication should be avoided.

The Role of the Correspondence Column

All biomedical journals should have a section carrying comments, questions, or criticisms about articles they have published and where the original authors can respond. Usually, but not necessarily, this may take the form of a correspondence column. The lack of such a section denies readers the possibility of responding to articles in the same journal that published the original work.

Competing Manuscripts Based on the Same Study

Editors may receive manuscripts from different authors offering competing interpretations of the same study. They have to decide whether to review competing manuscripts submitted to them more or less simultaneously by different groups or authors, or they may be asked to consider one such manuscript while a competing manuscript has been or will be submitted to another journal. Setting aside the unresolved question of ownership of data, we discuss here what editors ought to do when confronted with the submission of competing manuscripts based on the same study.

Two kinds of multiple submissions are considered: submissions by coworkers who disagree on the analysis and interpretation of their study, and submissions by coworkers who disagree on what the facts are and which data should be reported.

The following general observations may help editors and others dealing with this problem.

Differences in Analysis or Interpretation. Journals would not normally wish to publish separate articles by contending members of a research team who have differing analyses and interpretations of the data, and submission of such manuscripts should be discouraged. If coworkers cannot resolve their differences in interpretation before submitting a manuscript, they should consider submitting one manuscript containing multiple interpretations and calling their dispute to the attention of the editor so that reviewers can focus on the problem. One of the important functions of peer review is to evaluate the authors' analysis and interpretation and to suggest appropriate changes to the conclusions before publication. Alternatively, after the disputed version is published, editors may wish to consider a letter to the editor or a second manuscript from the dissenting authors. Multiple submissions present editors with a dilemma. Publication of contending manuscripts to air authors' disputes may waste journal space and confuse readers. On the other hand, if editors knowingly publish a manuscript written by only some of the collaborating team, they could be denying the rest of the team their legitimate coauthorship rights.

Differences in Reported Methods or Results. Workers sometimes differ in their opinions about what was actually done or observed and which data ought to be reported. Peer review cannot be expected to resolve this problem. Editors should decline further consideration of such multiple submissions until the problem is settled. Furthermore, if there are allegations of dishonesty or fraud, editors should inform the appropriate authorities.

The cases described above should be distinguished from instances in which independent, non-collaborating authors submit separate manuscripts based on different analyses of data that are publicly available. In this circumstance, editorial consideration of multiple submissions may be justified, and there may even be a good reason for publishing more than one manuscript because different analytical approaches may be complementary and equally valid.

World Medical Association Declaration of Helsinki

Recommendations Guiding Physicians in Biomedical Research Involving Human Subjects

Introduction

It is the mission of the physician to safeguard the health of the people. His or her knowledge and conscience are dedicated to the fulfillment of this mission.

The Declaration of Geneva of the World Medical Association binds the physician with the words, "The health of my patient will be my first consideration," and the International Code of Medical Ethics declares that, "A physician shall act only in the patient's interest when providing medical care which might have the effect of weakening the physical and mental condition of the patient."

The purpose of biomedical research involving human subjects must be to improve diagnostic, therapeutic and prophylactic procedures and the understanding of the aetiology and pathogenesis of disease.

In current medical practice most diagnostic, therapeutic or prophylactic procedures involve hazards. This applies especially to biomedical research.

Medical progress is based on research which ultimately must rest in part on experimentation involving human subjects.

In the field of biomedical research a fundamental distinction must be recognized between medical research in which the aim is essentially diagnostic or therapeutic for a patient, and medical research, the essential object of which is purely scientific and without implying direct diagnostic or therapeutic value to the person subjected to the research.

Special caution must be exercised in the conduct of research which may affect the environment, and the welfare of animals used for research must be respected.

Because it is essential that the results of laboratory experiments be applied to human beings to further scientific knowledge and to help suffering humanity, the World Medical Association has prepared the following recommendations as a guide to every physician in biomedical research involving human subjects. They should be kept under review in the future. It must be stressed that the standards as drafted are only a guide to physicians all over the world. Physicians are not relieved from criminal, civil and ethical responsibilities under the laws of their own countries.

I. Basic Principles

1. Biomedical research involving human subjects must conform to generally accepted scientific principles and should be based on adequately performed laboratory and animal experimentation and on a thorough knowledge of the scientific literature.
2. The design and performance of each experimental procedure involving human subjects should be clearly formulated in an experimental protocol which should be transmitted for consideration, comment and guidance to a specially appointed committee independent of the investigator and the sponsor provided that this independent committee is in conformity with the laws and regulations of the country in which the research experiment is performed.
3. Biomedical research involving human subjects should be conducted only by scientifically qualified persons and under the supervision of a clinically competent medical person. The responsibility for the human subject must always rest with a medically qualified person and never rest on the subject of the research, even though the subject has given his or her consent.
4. Biomedical research involving human subjects cannot legitimately be carried out unless the importance of the objective is in proportion to the inherent risk to the subject.
5. Every biomedical research project involving human subjects should be preceded by careful assessment of predictable risks in comparison with foreseeable benefits to the subject or to others. Concern for the interests of the subject must always prevail over the interests of science and society.
6. The right of the research subject to safeguard his or her integrity must always be respected. Every precaution

---

Adopted by the 18th World Medical Assembly, Helsinki, Finland, 1964, and amended by the 29th World Medical Assembly, Tokyo, Japan, 1975; 35th World Medical Assembly, Venice, Italy, 1983; 41st World Medical Assembly, Hong Kong, 1989; and the 48th General Assembly, Somerset West, Republic of South Africa, 1996.

Reprinted with permission from the World Medical Association.

should be taken to respect the privacy of the subject and to minimize the impact of the study on the subject's physical and mental integrity and on the personality of the subject.

7. Physicians should abstain from engaging in research projects involving human subjects unless they are satisfied that the hazards involved are believed to be predictable. Physicians should cease any investigation if the hazards are found to outweigh the potential benefits.
8. In publication of the results of his or her research, the physician is obliged to preserve the accuracy of the results. Reports of experimentation not in accordance with the principles laid down in this Declaration should not be accepted for publication.
9. In any research on human beings, each potential subject must be adequately informed of the aims, methods, anticipated benefits and potential hazards of the study and the discomfort it may entail. He or she should be informed that he or she is at liberty to abstain from participation in the study and that he or she is free to withdraw his or her consent to participation at any time. The physician should then obtain the subject's freely-given informed consent, preferably in writing.
10. When obtaining informed consent for the research project the physician should be particularly cautious if the subject is in a dependent relationship to him or her or may consent under duress. In that case the informed consent should be obtained by a physician who is not engaged in the investigation and who is completely independent of this official relationship.
11. In case of legal incompetence, informed consent should be obtained from the legal guardian in accordance with national legislation. Where physical or mental incapacity makes it impossible to obtain informed consent, or when the subject is a minor, permission from the responsible relative replaces that of the subject in accordance with national legislation. Whenever the minor child is in fact able to give a consent, the minor's consent must be obtained in addition to the consent of the minor's legal guardian.
12. The research protocol should always contain a statement of the ethical considerations involved and should indicate that the principles enunciated in the present Declaration are complied with.

II. Medical Research Combined with Professional Care (Clinical Research)

1. In the treatment of the sick person, the physician must be free to use a new diagnostic and therapeutic measure, if in his or her judgment it offers hope of saving life, reestablishing health or alleviating suffering.
2. The potential benefits, hazards and discomfort of a new method should be weighed against the advantages of the best current diagnostic and therapeutic methods.
3. In any medical study, every patient—including those of a control group, if any—should be assured of the best proven diagnostic and therapeutic method. This does not exclude the use of inert placebo in studies where no proven diagnostic or therapeutic method exists.
4. The refusal of the patient to participate in a study must never interfere with the physician-patient-relationship.
5. If the physician considers it essential not to obtain informed consent, the specific reasons for this proposal should be stated in the experimental protocol for transmission to the independent committee (Section I, Part 2).
6. The physician can combine medical research with professional care, the objective being the acquisition of new medical knowledge, only to the extent that medical research is justified by its potential diagnostic or therapeutic value for the patient.

III. Non-Therapeutic Biomedical Research Involving Human Subjects (Non-Clinical Biomedical Research)

1. In the purely scientific application of medical research carried out on a human being, it is the duty of the physician to remain the protector of the life and health of that person on whom biomedical research is being carried out.
2. The subjects should be volunteers—either healthy persons or patients for whom the experimental design is not related to the patient's illness.
3. The investigator or the investigating team should discontinue the research if in his/her or their judgment it may, if continued, be harmful to the individual.
4. In research on man, the interest of science and society should never take precedence over considerations related to the well-being of the subject.

RESPIRATORY CARE Standard Abbreviations and Symbols

Editor's Note: This compilation is adapted from the recommendations of the American Physiological Society and the ACCP-ATS Committee on Pulmonary Nomenclature. Some additions have been made.

Primary Symbols

Primary symbols are denoted by upper case, or capital letters.

C Compliance	S Saturation in the blood phase
D Diffusing capacity	t Time
F Fractional concentration of a gas	T Temperature
P Pressure	V Gas volume
$\dot{Q}$ Blood flow	X Any variable
Q Blood volume	$\bar{X}$ Mean value

A bar over a primary symbol denotes a mean or averaged value; for example, $\bar{P}$ is a mean pressure. A dot over a primary symbol denotes a time derivative, for example, $\dot{V}$ is dV/dt, or flow. The second derivative, with respect to time, is denoted by two dots above the primary symbol, for example, $\ddot{V}$ is d^2V/dt^2, or acceleration.

Qualifying Symbols

Qualifying symbols may be denoted by characters of regular size following the primary symbol or by subscripted characters—depending on printing capabilities.

A Alveolar	I Inspired
B Barometric	L Lung
D Dead space; wasted ventilation	T Tidal
E Expired	

ATPD	Ambient temperature and pressure, dry
ATPS	Ambient temperature and pressure, saturated with water vapor at these conditions
BTPS	Body temperature and pressure, saturated with water vapor at these conditions
STPD	Standard conditions: temperature 0 °C (273 °K), pressure 760 torr and dry

a	Arterial	est	Estimated
an	Anatomic	max	Maximal
b	Blood, in general	rb	Rebreathing
c	Capillary	v	Venous
ć	Pulmonary end-capillary	$\bar{v}$	Mixed venous

Abbreviations & Symbols in Common Use

Lung Volumes

TLC	Total lung capacity: the volume in the lungs at maximal inflation
RV	Residual volume: the volume of air remaining in the lungs after a maximal exhalation
ERV	Expiratory reserve volume: the maximal volume of air that can be exhaled from the end-expiratory position
IRV	Inspiratory reserve volume: the maximal volume that can be inhaled from the end-inspiratory level
IC	Inspiratory capacity: the sum of IRV and TV
IVC	Inspiratory vital capacity: the maximum volume of air inhaled from the point of maximum expiration
VC	Vital capacity: the volume equal to TLC – RV
VT	Tidal volume: that volume of air moved into or out of the lungs during quiet breathing (VT indicates a subdivision of the lung; when tidal volume is precisely measured, as in gas exchange calculation, the symbol VT or V_T is used.)
FRC	Functional residual capacity: the volume in the lungs at the end-expiratory position
RV/TLC%	Residual volume expressed as percent of TLC
V_A	Alveolar gas volume
V_L	Actual volume of the lung including the volume of the conducting airways

Forced Spirometry

FVC	Forced vital capacity: the determination of the vital capacity from a maximally forced expiratory effort
FEV_t	Forced expiratory volume (time): a generic term indicating the volume of air exhaled under forced conditions in the first *t* seconds
FEV_1	Volume that has been exhaled at the end of the first second of forced expiration

FEF_x	Forced expiratory flow related to some portion of the FVC curve; modifiers refer to amount of FVC already exhaled
FEF_{max}	The maximum instantaneous flow achieved during a FVC maneuver
$FEF_{25-75\%}$	Forced expiratory flow over the middle half of the FVC, that is, the average flow from the point where 25% of the FVC has been exhaled to the point where 75% has been exhaled. This formerly has been called the maximal midexpiratory flow rate (MMEFR).
FIF	Forced inspiratory flow: (Specific measurement of the forced inspiratory curve is denoted by nomenclature analogous to that for the forced expiratory curve. For example, maximum inspiratory flow is denoted FIF_{max}. Unless otherwise specified, volume qualifiers indicate the volume inspired from RV at the point of measurement.)
PEF	The highest forced expiratory flow measured with a peak flow meter
MVV	Maximal voluntary ventilation: volume of air expired in a specified period during repetitive maximal effort

Ventilation

f	Breathing frequency (breaths/minute or breaths/min)
$\dot{V}_A$	Alveolar ventilation/min
$\dot{V}_D$	Physiologic dead space ventilation/min
$\dot{V}_E$	Expired volume/min; V_E is exhaled volume/breath
$\dot{V}_{CO_2}$	Carbon dioxide production/min corrected for STPD conditions
$\dot{V}_{O_2}$	Oxygen consumption/min corrected for STPD conditions

Pulmonary Mechanics

C_{dyn}	Dynamic compliance: compliance measured at point of zero gas flow at the mouth during active breathing
C_{st}	Static compliance: compliance measured under conditions of prolonged interruption of airflow
E	Elastance: the reciprocal of compliance
G_{aw}	Airway conductance: the reciprocal of R_{aw}
sG_{aw}	Airway conductance at a specific lung volume
P_{aw}	Pressure in the airway; further modifiers to be specified
P_A	Alveolar pressure
P_{es}	Esophageal pressure used to estimate P_{pl}
P_L	Transpulmonary pressure
P_{pl}	Intrapleural pressure
P_{tm}	Transmural pressure, pertaining to an airway or blood vessel
PI_{max}	Maximal inspiratory pressure; this term is often symbolized as MIP
PE_{max}	Maximal expiratory pressure; this term is often symbolized as MEP
R	Resistance (ie, pressure per unit flow)
$\bar{R}$	Mean total resistance ($[R_I + R_E] \div 2$)
R_{aw}	Airway resistance
R_E	Total expiratory resistance measured by esophageal balloon method
R_I	Total inspiratory resistance measured by esophageal balloon method
R_L	Lung resistance
WOB	Work of breathing

Blood Gas, Acid-Base, & Gas Exchange Terms

P_{aO_2}	Arterial oxygen tension, or partial pressure
P_{AO_2}	Alveolar oxygen tension, or partial pressure
P_{aCO_2}	Arterial carbon dioxide tension, or partial pressure
P_{ACO_2}	Alveolar carbon dioxide tension, or partial pressure
$P_{\bar{v}O_2}$	Oxygen tension of mixed venous blood
$P_{(A\text{-}a)O_2}$	Alveolar-arterial oxygen tension difference. The term formerly used (A-a DO_2) is discouraged.
$P_{(a/A)O_2}$	Alveolar-arterial tension ratio; $Pa_{O_2} : P_{AO_2}$. We propose the term *oxygen exchange index* to describe this ratio.
$C_{(a\text{-}v)O_2}$	Arteriovenous oxygen content difference
S_{aO_2}	Oxygen saturation of the hemoglobin of arterial blood
S_{pO_2}	Oxygen saturation as measured by pulse oximetry
C_{aO_2}	Oxygen content of arterial blood
pH	Symbol relating the hydrogen ion concentration or activity of a solution to that of a standard solution; approximately equal to the negative logarithm of the hydrogen ion concentration. pH is an indicator of the relative acidity or alkalinity of a solution.

Blood Flow and Shunts

Q	Blood volume
$\dot{Q}$	Blood flow (volume units and time must be specific)

Q_c	Pulmonary capillary blood volume
Q_{sp}	Physiologic shunt flow (total venous admixture)
$\dot{Q}_{sp}/\dot{Q}_{tot}$	Shunt as percent of total blood flow

Diffusing Capacity

D_{LCOsb}	Diffusing capacity of the lung for carbon monoxide determined by the single-breath technique
D_m	Diffusing capacity of the alveolocapillary membrane (STPD)
D/V_A	Diffusion per unit of alveolar volume, with D at STPD and VA in liters BTPS

SI Units with Abbreviations

SI units are decimal units of measurement for physical properties and quantities that have been adopted by the scientific community worldwide. The reader is referred to Respir Care 1988;33:861-873, Respir Care 1989;34:145, and Respir Care 1997;42(6):639-640 for more information.

Variable	Unit	Abbreviation
temperature	kelvin	K
length	meter	m
mass	kilogram	kg
time	second	s
pressure	pascal	Pa
work, or energy	joule	J

Système International:
Examples of Conversions Commonly Used in Respiratory Physiology and Respiratory Care

Physical Quantity	Known Unit	Desired Unit	Example of Conversion Calculation
Force (or mass)	lb	kg	$150\ \text{lb} \times \frac{0.4536\ \text{kg}}{1\ \text{lb}} = 68\ \text{kg}$
	kg	lb	$68\ \text{kg} \times \frac{1\ \text{lb}}{0.4536\ \text{kg}} = 150\ \text{lb}$
Pressure	torr	kPa	$35\ \text{torr} \times \frac{0.1333\ \text{kPa}}{1\ \text{torr}} = 4.7\ \text{kPa}$
	kPa	torr	$4.7\ \text{kPa} \times \frac{1\ \text{torr}}{0.1333\ \text{kPa}} = 35\ \text{torr}$
	psi	torr	$1.0\ \text{psi} \times \frac{70.31\ \text{cm}\ H_2O}{1\ \text{psi}} \times \frac{0.7355\ \text{torr}}{1\ \text{cm}\ H_2O} = 52\ \text{torr}$
	torr	psi	$51.72\ \text{torr} \times \frac{1\ \text{cm}\ H_2O}{0.7355\ \text{torr}} \times \frac{1\ \text{psi}}{70.31\ \text{cm}\ H_2O} = 1.0\ \text{psi}$
Work	L · cm H_2O	kg · m	$20\ \text{L} \cdot \text{cm}\ H_2O \times \frac{0.09806\ \text{J}}{1\ \text{L} \cdot \text{cm}\ H_2O} \times \frac{1\ \text{kg} \cdot \text{m}}{9.807\ \text{J}} = 0.2\ \text{Kg} \cdot \text{m}$
	J	L · cm H_2O	$2\ \text{J} \times \frac{1\ \text{kg} \cdot \text{m}}{9.807\ \text{J}} \times \frac{1\ \text{L} \cdot \text{cm}\ H_2O}{0.01\ \text{kg} \cdot \text{m}} = 20\ \text{L} \cdot \text{cm}\ H_2O$
Power	kg · m · min^{-1}	W	$2.5\ \text{kg} \cdot \text{m} \cdot \text{min}^{-1} \times \frac{0.1634\ \text{W}}{1\ \text{kg} \cdot \text{m} \cdot \text{min}^{-1}} = 0.41\ \text{W}$
Compliance	mL/cm H_2O	L/kPa	$100\ \text{mL} \cdot \text{cm}\ H_2O \times \frac{1\text{L}}{1000\ \text{mL}} \times \frac{10.20\ \text{L} \cdot \text{kPa}^{-1}}{1\ \text{L} \cdot \text{cm}\ H_2O^{-1}} = 1.02\ \text{L} \cdot \text{kPa}^{-1}$
Resistance	cm $H_2O \cdot s \cdot L^{-1}$	kPa · s · L^{-1}	$55\ \text{cm}\ H_2O \cdot \text{s} \cdot \text{L}^{-1} \times \frac{0.090806\ \text{kPa} \cdot \text{L}^{-1}}{1\ \text{cm}\ H_2O \cdot \text{s} \cdot \text{L}^{-1}} = 5.4\ \text{kPa} \cdot \text{s} \cdot \text{L}^{-1}$

Note: Retain all digits during computation to avoid roundoff error. However, the least precise measurement used in a calculation determines the number of significant digits in the answer. Thus, the final product or quotient should be written with the same number of significant figures as the term with the fewest significant figures, as shown in the examples above. The least ambiguous method of indicating the number of significant figures is to write the number in scientific notation. For example, the number 30 may have either one or two significant figures, but written as 3.0×10^1, it is understood that there are two significant figures. For more information about scientific notation, significant figures, and rounding off, see Lough MD, Chatburn RL, Shrock WA, Handbook of respiratory care. Chicago: Yearbook Medical Publishers, 1985:170-173

Système International: Conversion Factors for Units Commonly Used in Medicine

Physical Quantity	Conventional Unit	SI Unit	Conversion Factor*
Length	inch (in.)	meter (m)	0.025 4
	foot (ft)	m	0.304 8
Area	$in.^2$	m^2	6.452×10^{-4}
	ft^2	m^2	0.092 90
Volume	dL (= 100 mL)	L	0.01
	ft^3	m^3	0.028 32
	ft^3	L	28.32
	fluid ounce	mL	29.57
Amount of substance	mg/dL	mmol/L	10/molecular weight
	mEq/L	mmol/L	valence
	mL of gas at STPD	mmol	0.044 62
Force (weight)	pound (lb)	newton (N)	4.448
	dyne	N	0.000 01
	kilogram-force	N	9.807
	pound	kilogram-force	0.453 6
	ounce	gram-force	28.35
Pressure	cm H_2O	kilopascal (kPa)	0.098 06
	mm Hg (torr)	kPa	0.133 3
	pounds/$in.^2$ (psi)	kPa	6.895
	psi	cm H_2O	70.31
	cm H_2O	torr	0.7355
	standard atmosphere	kPa	101.3
	millibar (mbar)	kPa	0.100 0
Work, energy	kg · m	joule (J)	9.807
	L · cm H_2O	joule (J)	0.098 06
	calorie (cal)	joule (J)	4.185
	kilocalorie (kcal)	J	4 185
	British thermal unit (BTU)	—	1055
Power	kg · m · min^{-1}	watt (W)	0.163 4
Surface tension	dyn/cm	N/m	0.001
Compliance	L/cm H_2O	L/kPa	10.20
Resistance	cm H_2O · s · L^{-1}	kPa · s · L^{-1}	0.098 06
	cm H_2O · min · L^{-1}	kPa · s · L^{-1}	5.884
Gas transport (ideal gas, STPD)	mL · s^{-1} · cm H_2O^{-1}	mmol · s^{-1} · kPa^{-1}	0.455 0
Temperature	°C	°K	°K = °C + 273.15
	°F	°C	°C = (°F − 32)/1.8
	°C	°F	°F = (1.8 · °C) + 32

*To convert from conventional to SI unit, multiply conventional unit by conversion factor. To convert in the opposite direction, divide by conversion factor. Examples: 10 torr = 10 × 0.133, 3 kPa = 1.333 kPa, 1 L = 1 L/0.10 = 10 dL

Key to Abbreviations & Acronyms

a-A	arterial-alveolar
AARC	American Association for Respiratory Care
ABG	arterial blood gas
ACCP	American College of Chest Physicians
AHA	American Hospital Association
AI	artificial intelligence
AIDS	acquired immunodeficiency syndrome
ALS	amyotrophic lateral sclerosis
AMP	adenosine monophosphate
APRV	airway pressure release ventilation
ARDS	acute respiratory distress syndrome
ARF	acute respiratory failure
ATS	American Thoracic Society
auto-PEEP	unintended positive end-expiratory pressure
B-P	bronchopleural (eg, B-P fistula or air leak)
BPD	bronchopulmonary dysplasia
CAI	computer-assisted instruction
CCC	chondroplasia calcificans congenita
CDC	Centers for Disease Control
CINAHL	Cumulative Index to Nursing & Allied Health Literature
CLD	chronic lung disease
CO	carbon monoxide
COLD	chronic obstructive lung disease
COP	colloid oncotic pressure
COPD	chronic obstructive pulmonary disease
CO_2	carbon dioxide
CPAP	continuous positive airway pressure
CPR	cardiopulmonary resuscitation
CPT	chest physical therapy
CT	computerized tomography
D_{LCOsb}	single-breath diffusion of carbon monoxide across the lung
DME	durable medical equipment
DRG	diagnosis-related group
ECMO	extracorporeal membrane oxygenation
EIB	exercise-induced bronchospasm
EOA	esophageal obturator airway
EPAP	end-positive airway pressure
FDA	U.S. Food & Drug Administration
$FEF_{25-75\%}$	forced expiratory flow over middle half of FVC
FEV	forced expiratory volume
FEV_1	forced expiratory volume in first second
F_{IO_2}	fraction of inspired oxygen
F_{DO_2}	fraction of oxygen delivered (by device)
FRC	functional residual capacity
FVC	forced vital capacity
HCFA	Health Care Financing Administration
HFV	high-frequency ventilation
HFJV	high-frequency jet ventilation
HFO	high-frequency oscillation
HFOV	high-frequency oscillatory ventilation
HFPPV	high-frequency positive-pressure ventilation
HFPV	high-frequency percussive ventilation
HIV	human immunodeficiency virus
HMD	hyaline membrane disease
HME	heat & moisture exchanger (artificial nose)
HMEF	heat & moisture exchanging filter
ICP	intracranial pressure
ICU	intensive care unit
I-E	inspiration-expiration (ratio)
ILD	interstitial lung disease
IMV	intermittent mandatory ventilation
IPPB	intermittent positive-pressure breathing
MIGET	multiple inert gas elimination technique
MIP	maximal inspiratory pressure
MLT	minimal leak technique (of cuff inflation)
MRI	magnetic resonance imaging
MV	mechanical ventilation
NBRC	National Board for Respiratory Care
NFPA	National Fire Protection Association
NG	nasogastric (tube)
NHLBI	National Heart, Lung, & Blood Institute
NIH	National Institutes of Health
NOTT	Nocturnal Oxygen Therapy Trial
NO_2	nitrous oxide
NPPV	noninvasive positive pressure ventilation
OSA	obstructive sleep apnea
O_2	oxygen
$P_{(A-a)O_2}$	alveolar-arterial oxygen-tension difference
P_{aCO_2}	arterial carbon dioxide tension
P_{aO_2}	arterial oxygen tension
PCP	*Pneumocystis carinii* pneumonia
PDA	patent ductus arteriosus
PEEP	positive end-expiratory pressure
PFC	persistent fetal circulation
PFT	pulmonary function test or testing
PIE	pulmonary interstitial emphysema
P_{O_2}	oxygen tension
PSV	pressure-support ventilation
$P_{\bar{v}O_2}$	mixed venous oxygen tension

RCP	respiratory care practitioners (professionals)
RDS	respiratory distress syndrome (of infants)
RICU	respiratory intensive care unit
RIP	respiratory inductive plethysmography
RQ	respiratory quotient
S_{aO_2}	arterial oxygen saturation
SCCM	Society for Critical Care Medicine
SI	Système International d'Unités (a system of units of measure)
SIDS	sudden infant death syndrome
SIMV	synchronized intermittent mandatory ventilation
S_{pO_2}	saturation measured via pulse oximetry
$S_{\bar{v}O_2}$	mixed venous oxygen saturation
tcP_{O_2}	transcutaneous oxygen tension
T-E	tracheoesophageal (fistula)
TGV	thoracic gas volume
TLC	total lung capacity
USP	United States Pharmacopeia
VA	Veterans Administration
VC	vital capacity
V_{CO_2}	carbon dioxide production
VDR	volumetric diffusion respiration
V/Q	ventilation-perfusion ratio
V_T	tidal volume
WOB	work of breathing

RESPIRATORY CARE

Manuscript Preparation Guide

General Information

RESPIRATORY CARE welcomes original manuscripts related to the science and technology of respiratory care and prepared according to these Instructions and the *Uniform Requirements for Manuscripts Submitted to Biomedical Journals* [Respir Care 1997; 42(6):623-634]. Manuscripts are blinded and reviewed by professionals who are experts in their fields. Authors are responsible for all aspects of the manuscript and receive galleys to proofread before publication. Each accepted manuscript is copyedited so that its message is clear and it conforms to the Journal's style. Published papers are copyrighted by Daedalus Inc and may not be published elsewhere without permission.

Editorial consultation is available at any stage of planning or writing. On request, specific guidance is provided for all publication categories. To receive these Instructions and related materials, write to RESPIRATORY CARE, 11030 Ables Lane, Dallas TX 75229-4593, call (972) 243-2272, or fax (972) 484-6010.

Publication Categories & Structure

Research Article: A report of an original investigation (a study). It includes a Title Page, Abstract, Introduction, Methods, Results, Discussion, Conclusions, Product Sources, Acknowledgments, References, Tables, Appendices, Figures, and Figure Captions.

Evaluation of Device/Method/Technique: A description and evaluation of an old or new device, method, technique, or modification. It has a Title Page, Abstract, Introduction, Description of Device/Method/Technique, Evaluation Methods, Evaluation Results, Discussion, Conclusions, Product Sources, Acknowledgments, References, Tables, Appendices, Figures, and Figure Captions. Comparative cost data should be included wherever possible.

Case Report: A report of a clinical case that is uncommon, or was managed in a new way, or is exceptionally instructive. All authors must be associated with the case. A case-managing physician must either be an author or furnish a letter approving the manuscript. Its components are Title Page, Abstract, Introduction, Case Summary, Discussion, References, Tables, Figures, and Figure Captions.

Review Article: A comprehensive, critical review of the literature and state-of-the-art summary of a pertinent topic that has been the subject of at least 40 published research articles. Title Page, Outline, Introduction, Review of the Literature, Summary, Acknowledgments, References. Tables, Appendices, and Figures and Captions may be included.

Overview: A critical review of a pertinent topic that has fewer than 40 published research articles.

Update: A report of subsequent developments in a topic that has been critically reviewed in this Journal or elsewhere.

Point-of-View Paper: A paper expressing personal but substantiated opinions on a pertinent topic. Title Page, Text, References, Tables, and Illustrations may be included.

Special Article: A pertinent paper not fitting one of the foregoing categories may be acceptable as a Special Article. Consult with the Editor before writing or submitting such a paper.

Editorial: A paper drawing attention to a pertinent concern; it may present an opposing opinion, clarify a position, or bring a problem into focus.

Letter: A signed communication, marked "For publication," about prior publications in this Journal or about other pertinent topics. Tables and illustrations may be included.

Blood Gas Corner: A brief, instructive case report involving blood gas values—with Questions, Answers, and Discussion.

Drug Capsule: A mini-review paper about a drug or class of drugs that includes discussions of pharmacology, pharmacokinetics, and pharmacotherapy.

Graphics Corner: A brief case report incorporating waveforms for monitoring or diagnosis—with Questions, Answers, and Discussion.

Kittredge's Corner: A brief description of the operation of respiratory care equipment—with information from manufacturers and editorial comments and suggestions.

PFT Corner: Like Blood Gas Corner, but involving pulmonary function tests.

Cardiorespiratory Interactions. A case report demonstrating the interaction between the cardiovascular and respiratory systems. It should be a patient-care scenario; however, the case—the central theme—is the systems interaction. CRI is characterized by figures, equations, and a glossary. See the March 1996 Issue of RESPIRATORY CARE for more detail.

Test Your Radiologic Skill: Like Blood Gas Corner, but involving pulmonary medicine radiography and including one or more radiographs; may involve imaging techniques other than conventional chest radiography.

Review of Book, Film, Tape, or Software: A balanced, critical review of a recent release.

Preparing the Manuscript

Print on one side of white bond paper, 8.5 in. x 11 in. (216 x 279 mm) with margins of at least 1 in. (25 mm) on all sides of the page. Use ***double-spacing*** throughout the ***entire*** manuscript. Use a standard font (eg, Times, Helvetica, or Courier) at least 10 points in size, and

do not use italics except for special emphasis. Number all pages in upper-right corners. Indent paragraphs 5 spaces. Do ***not justify***. **Do *not* put authors' names, institutional affiliations or allusions to institutional affiliations in the text, or other identification anywhere except on the title page.** Repeat title only (no authors) on the abstract page. Begin each of the following on a new page: Title Page, Abstract, Text, Product Sources List, Acknowledgments, References, each Table, and each Appendix. Use standard English in the first person and active voice.

Center main section headings on the page and type them in capital and small letters (eg, Introduction, Methods, Results, Discussion). Begin subheadings at the left margin and type them in capital and small letters (eg, Patients, Equipment, Statistical Analysis).

References. Cite only published works as references. Manuscripts accepted but not yet published may be cited as references: designate the accepting journal, followed by (in press), and provide 3 copies of the in-press article for reviewer inspection. Cite references in the text with superscript numerals. Assign numbers in the order that references are first cited. On the reference page, list the cited works in numerical order. Follow the Journal's style for references. Abbreviate journal names as in *Index Medicus*. List all authors.

Article in a journal carrying pagination throughout volume:

> Rau JL, Harwood RJ. Comparison of nebulizer delivery methods through a neonatal endotracheal tube: a bench study. Respir Care 1992;37(11):1233-1240

Article in a publication that numbers each issue beginning with Page 1:

> Bunch D. Establishing a national database for home care. AARC Times 1991;15(Mar):61,62,64

Corporate author journal article:

> American Association for Respiratory Care. Criteria for establishing units for chronic ventilator-dependent patients in hospitals. Respir Care 1988;33(11):1044-1046.

Article in journal supplement: (Journals differ in their methods of numbering and identifying supplements. Supply sufficient information to promote retrieval.)

> Reynolds HY. Idiopathic interstitial pulmonary fibrosis. Chest 1986; 89(3 Suppl):139S-143S

Abstract in journal: (Abstracts citations are to be avoided. Those more than 3 years old should not be cited.)

> Stevens DP. Scavenging ribavirin from an oxygen hood to reduce environmental exposure (abstract). Respir Care 1990;35(11): 1087-1088.

Editorial in journal:

> Enright P. Can we relax during spirometry? (editorial). Am Rev Respir Dis 1993;148(2):274.

Editorial with no author given:

> Negative-pressure ventilation for chronic obstructive pulmonary disease (editorial). Lancet 1992;340(8833):1440-1441.

Letter in journal:

> Aelony Y. Ethnic norms for pulmonary function tests (letter). Chest 1991;99(4):1051.

Paper accepted but not yet published:

> Hess D. New therapies for asthma. Respir Care (year, in press).

Personal author book: (For any book, specific pages should be cited whenever possible.)

> DeRenee RA. Clinical profiles of diffuse interstitial pulmonary disease. New York: Futura; 1990. p. 76-85.

Corporate author book:

> American Medical Association Department of Drugs. AMA drug evaluations, 3rd ed. Littleton CO: Publishing Sciences Group; 1977.

Chapter in book with editor(s):

> Pierce AK. Acute respiratory failure. In: Guenter CA, Welch MH, editors. Pulmonary medicine. Philadelphia: JB Lippincott; 1977.

Tables. Use consecutively numbered tables to display information. Start each table on a separate page. Number and title the table and give each column a brief heading. Place explanations in footnotes, including all nonstandard abbreviations and symbols. Key the footnotes with conventional designations (*, †, ‡, ||, ¶, **, ††) in consistent order, placing them superscript in the table body. Do not use horizontal or vertical rules or borders. Do not submit tables as photographs, reduced in size, or on oversize paper. Use the same typeface as in the text.

Illustrations. Graphs, line drawings, photographs, and radiographs are figures. Use only illustrations that clarify and augment the text. Number them consecutively as Fig. 1, Fig. 2, and so forth according to the order by which they are mentioned in the text. Be sure all figures are cited. If any figure was previously published, include copyright holder's written permission to reproduce. Figures for publication must be of professional quality. Data for the original graphs should be available to the Editor upon request. If color is essential, consult the Editor for more information. In reports of animal experiments, use schematic drawings, not photographs. A letter of consent must accompany any photograph of a person. Do not place titles and detailed explanations on figures; put this information in figure captions. If possible, submit radiographs as prints and full-size copies of film.

Drugs. Identify precisely all drugs and chemicals used, giving generic names, doses, and routes of administration. If desired, brand names may be given in parentheses after generic names. Drugs should be listed on the product-sources page.

Commercial Products. In parentheses in the text, identify any commercial product (including model number if applicable) the first time it is mentioned, giving the manufacturer's name, city, and state or country. If four or more products are mentioned, do not list any manufacturers in the text; instead, list them on a Product Sources page at the end of the text, before the References. Provide model numbers when available and manufacturer's suggested price, if the study has cost implications.

Ethics. When reporting experiments on human subjects, indicate that procedures were conducted in accordance with the ethical standards of the *World Medical Association Declaration of Helsinki* [Respir Care 1997;42(6):635-636] or of the institution's committee

on human experimentation. State that informed consent was obtained. Do not use patient's names, initials, or hospital numbers in text or illustrations. When reporting experiments on animals, indicate that the institution's policy, a national guideline, or a law on the care and use of laboratory animals was followed.

Statistics. Identify the statistical tests used in analyzing the data, and give the prospectively determined level of significance in the Methods section. Report actual p values in Results. Cite only textbook and published article references to support choices of tests. Identify any general-use or commercial computer programs used, naming manufacturers and their locations. These should be listed on the product-sources page.

Units of Measurement. Express measurements of length, height, weight, and volume in metric units appropriately abbreviated; temperatures in degrees Celsius; and blood pressures in millimeters of mercury (mm Hg). Report hematologic and clinical-chemistry measurements in conventional metric and in SI (*Systémé Internationale*) units. Show gas pressures (including blood gas tensions) in torr. List SI equivalent values, when possible, in brackets following non-SI values—for example, "PEEP, 10 cm H_2O [0.981 kPa]." For conversion to SI, see RESPIRATORY CARE 1988;33(10):861-873 (Oct 1988), 1989;34(2):145 (Feb 1989), and 1997;42(6):639-640 (June 1997).

Conflict of Interest. Authors are asked to disclose any liaison or financial arrangement they have with a manufacturer or distributor whose product is part of the submitted manuscript or with the manufacturer or distributor of a competing product. (Such arrangements do not disqualify a paper from consideration and are not disclosed to reviewers.) A statement to this effect is included on the cover-letter page. (Reviewers are screened for possible conflict of interest.)

Abbreviations and Symbols. Use standard abbreviations and symbols. Avoid creating new abbreviations. Avoid all abbreviations in the title and unusual abbreviations in the abstract. Use an abbreviation only if the term occurs several times in the paper. Write out the full term the first time it appears, followed by the abbreviation in parentheses. Thereafter, employ the abbreviation alone. Never use an abbreviation without defining it. Standard units of measurement can be abbreviated without explanation (eg, 10 L/min, 15 torr, 2.3 kPa).

Please use the following forms: cm H_2O (not cmH2O), f (not bpm), L (not l), L/min (not LPM, l/min, or lpm), mL (not ml), mm Hg (not mmHg), pH (not Ph or PH), $p > 0.001$ (not p>0.001), s (not sec), S_{pO_2} (pulse-oximetry saturation). See RESPIRATORY CARE: Standard Abbreviations and Symbols [Respir Care 1997;42(6):637-642].

Computer Diskettes. Authors are encouraged to submit electronic versions of manuscripts as well as printed copies (3.5 in. diskettes in Macintosh or IBM-DOS format). Label each diskette with date; author's name; name and version of word-processing program used; and filename(s). Software used to produce graphics and tables should be similarly identified. Do not write on diskette labels except with felt-tipped pen. If revision of a manuscript is required as a condition of acceptance for publication, we ask that an electronic version of revision be supplied to facilitate copyediting and production.

Prior and Duplicate Publication. Work that has been published or accepted elsewhere should not be submitted. In special instances, the Editor may consider such material, provided that permission to publish is given by the author and original publisher. Please consult the Editor before submitting such work.

Authorship. All persons listed as authors should have participated in the reported work and in the shaping of the manuscript; all must have proofread the submitted manuscript; and all should be able to publicly discuss and defend the paper's content. A paper with corporate authorship must specify the key persons responsible for the article. Authorship is not justified solely on the basis of solicitation of funding, collection or analysis of data, provision of advice, or similar services. Persons who provide such ancillary services exclusively may be recognized in an Acknowledgments section.

Permissions. The manuscript must be accompanied by copies of permissions to reproduce previously published material (figures or tables); to use illustrations of, or report sensitive personal information about, identifiable persons; and to name persons in the Acknowledgments section.

Reviewers. Please supply the names, credentials, affiliations, addresses, and phone/fax numbers of three professionals whom you consider expert on the topic of your paper. Your manuscript may be sent to one or more of them for blind peer review.

Submitting the Manuscript

Mail three copies [1 copy with author(s) name(s), affiliation(s), 2 copies without name(s) and affiliation(s) for reviewers] of the manuscript, figures, and 1 diskette, and the Cover Letter & Checklist to RESPIRATORY CARE, 11030 Ables Lane, Dallas TX 75229-4593. Do not fax manuscripts. Protect figures with cardboard. Keep a copy of the manuscript and figures. Receipt of your manuscript will be acknowledged.

Editorial Office:

RESPIRATORY CARE
11030 Ables Lane
Dallas TX 75229-4593

(972) 243-2272 (telephone)
(972) 484-6010 (fax)
e-mail: respircare@aarc.org

Cover Letter & Checklist

A copy of this completed form must accompany all manuscripts submitted for publication.

Title of Paper: _____

Publication Category: _____

Authors: _____

Author to be Contacted: _____ Phone: _____ FAX: _____

Mailing Address of Contact Author: _____

Reprints: ☐ Yes ☐ No

"We, the undersigned, have all participated in the work reported, proofread the accompanying manuscript, and approve its submission for publication." Please print and include credentials, title, institution, academic appointments, city and state. If more than 4 authors, please use another copy of this form.*

*Author Data: _____

Author Signature/Date _____

*Author Data: _____

Author Signature/Date _____

*Author Data: _____

Author Signature/Date _____

*Author Data: _____

Author Signature/Date _____

Has this research been presented in a public forum? ☐ Yes ☐ No

If yes, where, when and by whom? _____

Has this research received awards? ☐ Yes ☐ No

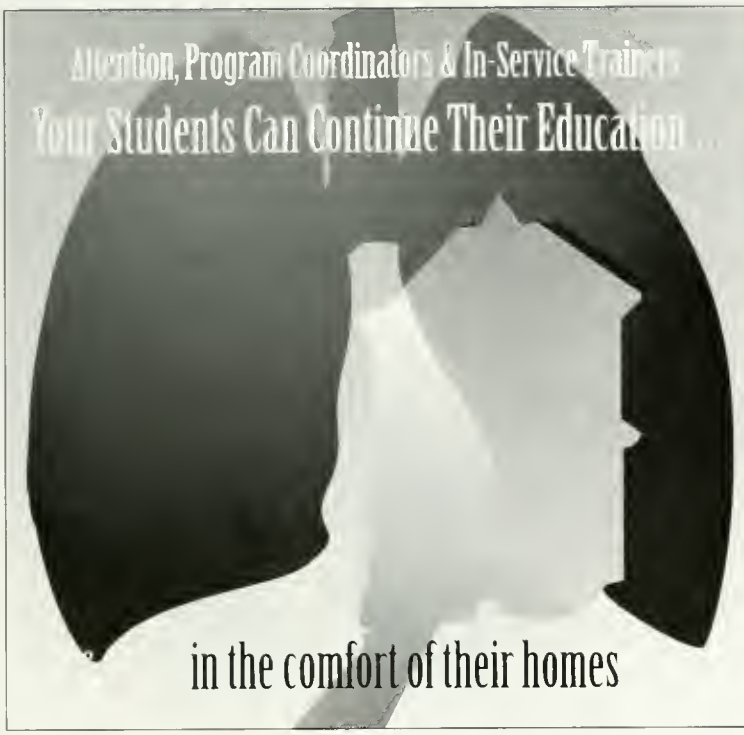
If yes, please describe. _____

Do any of the authors have a financial interest in the products mentioned in this paper or competing products?

☐ Yes ☐ No If yes, please disclose: _____

Checklist:

- ☐ Is double-spacing used throughout entire manuscript?
- ☐ Are all pages numbered in upper-right corners?
- ☐ Are all references, figures, and tables cited in the text?
- ☐ Has the accuracy of the references been checked, and are they correctly formatted?
- ☐ Have SI values been provided?
- ☐ Has all arithmetic been checked?
- ☐ Have generic names of drugs been provided?
- ☐ Have necessary written permissions been provided?
- ☐ Have authors' names been omitted from text and figure labels?
- ☐ Have copies of 'in press' references been provided?
- ☐ Has the manuscript been proofread by all the authors?


Attention, Program Coordinators & In-Service Trainers
Your Students Can Continue Their Education ...
in the comfort of their homes

Encourage your students to read each issue of RESPIRATORY CARE! Then when the August issue arrives, they can complete

CRCE through the Journal

and receive 6 hours of CRCE credit* through:

- Careful reading
- Thoughtful study
- Test completion

Only $5

*Specific state licensure regulations apply

AARC Clinical Practice Guidelines

CPG 1 — Spirometry, 1996 Update · $1
CPG 2 — Oxygen Therapy in Acute Care Hospital · $1
CPG 3 — Nasotracheal Suctioning · $1
CPG 4 — Patient-Ventilator System Checks · $1
CPG 5 — Directed Cough · $1
CPG 6 — In-Vitro pH and Blood Gas Analysis and Hemoximetry · $1
CPG 7 — Use of Positive Airway Pressure Adjuncts to Bronchial Hygiene Therapy · $1
CPG 8 — Sampling for Arterial Blood Gas Analysis · $1
CPG 9 — Endotracheal Suctioning of Mechanically Ventilated Adults and Children with Artificial Airways · $1
CPG10 — Incentive Spirometry · $1
CPG11 — Postural Drainage Therapy · $1
CPG12 — Bronchial Provocation · $1
CPG13 — Selection of Aerosol Delivery Device · $1
CPG14 — Pulse Oximetry · $1
CPG15 — Single-Breath Carbon Monoxide Diffusing Capacity · $1
CPG16 — Oxygen Therapy in the Home or Extended Care Facility · $1
CPG17 — Exercise Testing for Evaluation of Hypoxemia and/or Desaturation · $1
CPG18 — Humidification during Mechanical Ventilation · $1
CPG19 — Transport of the Mechanically Ventilated Patient · $1
CPG20 — Resuscitation in Acute Care Hospitals · $1
CPG21 — Bland Aerosol Administration · $1
CPG22 — Fiberoptic Bronchoscopy Assisting · $1
CPG23 — Intermittent Positive Pressure Breathing (IPPB) · $1
CPG24 — Application of CPAP to Neonates Via Nasal Prongs or Nasopharyngeal Tube · $1
CPG25 — Delivery of Aerosols to the Upper Airway · $1
CPG26 — Neonatal Time-Triggered, Pressure-Limited, Time-Cycled Mechanical Ventilation · $1
CPG27 — Static Lung Volumes · $1
CPG28 — Surfactant Replacement Therapy · $1
CPG29 — Ventilator Circuit Changes · $1
CPG30 — Metabolic Measurement using Indirect Calorimetry during Mechanical Ventilation · $1
CPG31 — Transcutaneous Blood Gas Monitoring for Neonatal & Pediatric Patients · $1
CPG32 — Body Plethysmography · $1
CPG33 — Capillary Blood Gas Sampling for Neonatal & Pediatric Patients · $1
CPG34 — Defibrillation during Resuscitation · $1
CPG35 — Infant/Toddler Pulmonary Function Tests · $1
CPG36 — Management of Airway Emergencies · $1
CPG37 — Assessing Response to Bronchodilator Therapy at Point of Care · $1
CPG38 — Discharge Planning for the Respiratory Care Patient · $1
CPG39 — Long-Term Invasive Mechanical Ventilation in the Home · $1
CPG40 — Capnography/Capnometry during Mechanical Ventilation · $1
CPG41 — Selection of an Aerosol Delivery Device for Neonatal and Pediatric Patients · $1
CPG42 — Polysomnography · $1
CPG43 — Selection of an Oxygen Delivery Device for Neonatal and Pediatric Patients · $1
CPG44 — Selection of a Device for Delivery of Aerosol to the Lung Parenchyma · $1
CPG45 — Training the Health-Care Professional for the Role of Patient and Caregiver Educator · $1
CPG46 — Providing Patient and Caregiver Training · $1

CPG99 — Complete Set in Binder · $35

($60 nonmembers) (+$7.00 for Shipping and Handling)

American Association for Respiratory Care
11030 Ables Ln., Dallas, TX 75229-4593

Call (972) 243-2272 or fax to (972) 484-2720
with MasterCard, Visa, or Purchase Order Number

Texas customers only, please add 8.25% sales tax (including shipping charges). Texas customers that are exempt from sales tax must attach an exemption certificate. Prices subject to change without notice.

Contributions to this section are welcome. Send double-spaced typed material (and illustrations if pertinent) to Historical Notes, RESPIRATORY CARE, 11030 Ables Lane, Dallas TX 75229-4593. Identify source of material and include your name, credentials, and address

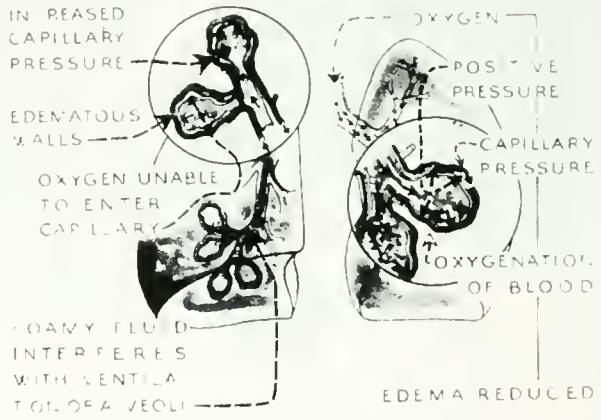
Effective Inhalation Therapy: Pulmonary Edema

An Excerpt from 1953

In many acute heart attacks, regardless of the cause, as well as most cases of chronically failing hearts, an edematous condition of the lungs occurs. There are various mechanisms that produce this, among these being an increased pressure in the capillaries surrounding the alveoli of the lung. This mechanism is singled out because it may respond directly to inhalation therapy.

The edematous lung shows thickening of alveolar walls, liquid in the alveoli and the small bronchi leading to them, and eventually such liquid in the larger bronchi. Because of position, and the circulation of the lung, it is generally found earliest at the bases. As the condition increases, more and more areas of the lung and bronchi become "water-logged." It is obvious that fluid in the alveoli will interfere very seriously with oxygen reaching the blood stream. This is the cause of death in drowning and such a patient drowns in his own secretion if the course of the disease is not altered.

Any patient with recognizable pulmonary edema will benefit from oxygen inhalation. The mechanism of improvement is not too far removed from that found in pneumonia. Around the completely filled alveoli are sacs that are partially filled. These will absorb oxygen from inhaled air with some difficulty. Increase in the oxygen content enables the blood in these areas to receive its normal amount of oxygen. In addition to that, the amount of oxygen that dissolves in the serum represents a volume that can be absorbed into the blood even in filled alveoli. As stated before, if the percentage in the inhaled atmosphere is high enough, it is possible for the blood in these filled alveoli to take up a respectable amount of this dissolved oxygen.



The local mechanism of pulmonary edema and the resulting interference in ventilation. Improvement in ventilation, oxygenation of blood, and reduction of edema with adequate inhalation therapy.

Consequently, the value of oxygen therapy in pulmonary edema will depend upon how much of the deficiency in the saturation of the hemoglobin can be made up. If the area of edema is not very great, the use of concentrations between 40 and 60 per cent is sufficient. Tent, catheter, or mask will deliver this amount and may be used according to the indication of the individual case. If there is a more extensive area of edema, such that it is important to attempt to push some oxygen past the fluid, concentrations of 75 per cent and up should be sought. These obviously require the use of the face mask.

But there is something more that can be accomplished with inhalation therapy in pulmonary edema. Part of the mechanism was a greater pressure in the pulmonary capillaries. If pressure in the alveoli can be increased, it will tend to neutralize the capillary pressure and improve the edematous condition. This can be secured by the use of the positive pressure mask or helmet. When the mask is applied, the patient who is dyspneic and fearful should not at that time be required to breathe against a positive pressure, since this will add to his anxiety. Therefore, at the beginning, no expiratory pressure should be used until a period ranging from 15 to 30 minutes has elapsed. At that time the pressure should be increased gradually, 1 cm of water at a time, until after not less than 30

From **Effective Inhalation Therapy**, pages 104-108, written by Edwin R Levine MD in cooperation with Alvan L. Barach MD, J Winthrop Peabody MD, and Maurice Segal MD, and published in 1953 by the National Cylinder Gas Co of Chicago. Dr Levine, a chest physician, was an early champion of our profession and President of the American Association for Inhalation Therapy in 1952 (the only physician in the Association's history to so serve). The other authors were also pioneers in pulmonary medicine and inhalation therapy.

This excerpt was made available to RESPIRATORY CARE by Teri Nikolai Wilson RRT RPFT, United Healthcare of Ohio, Centerville, Ohio.

minutes the patient is breathing out against a pressure of 4 cms. At this time, there will be an increased alveolar pressure as well as an increased bronchial pressure and in many cases the edema begins to clear. At the same time, the dyspnea of the patient may show considerable improvement.

This positive pressure exhalation may be continued for varying periods, depending upon the condition of the patient. In most cases, after one and a half to two hours, it is desirable to lower the pressure. However, if this is done suddenly, it will counteract all of the good that has been done in the treatment period. Consequently, the pressure should be taken down in steps similar to those by which it was elevated. In other words, the alveoli must be decompressed gradually. After a rest period which should not be too long, the pressure should be increased gradually once more. This should be continued as long as the patient shows evidence of pulmonary edema.

Another technique in the management of severe pulmonary edema is the inhalation of alcohol vapor. The theory of this depends upon the fact that alcohol increases the surface tension and thus tends to prevent or eliminate bubbles and froth. In the severe cases the major bronchi may be all but completely obstructed by this froth and its elimination will open the airway although it may increase the amount of liquid in the alveoli. The immediate effect is of marked relief to the patient.

Alcohol is administered through the ordinary humidifying bottle attached to the oxygen cylinder. If a mask is used the percentage of alcohol should vary from 20 to 35. If a catheter is used percentages up to 95 have been recommended. *Care should be taken in removing the regulator from the cylinder that the alcohol is not allowed to flow into the regulator, since oxygen and alcohol under pressure may prove an explosive mixture.*

AARC

43rd International Respiratory Congress
December 6-9 • New Orleans, Louisiana

Books, Films, Tapes, & Software

Listing and Reviews of Books and Other Media
Note to publishers: Send review copies of books, films, tapes, and software to RESPIRATORY CARE, 11030 Ables Lane, Dallas TX 75229-4593.

Pulmonary/Respiratory Therapy Secrets edited by PE Parsons and JE Heffner with 124 contributors. Softcover, 488 pages, illustrated. Philadelphia: Hanley & Belfus Inc, 1997. $35.95.

Textbooks in the health professions sometimes approach their subject in an organized but boring fashion. Key concepts are often buried and lost to the surrounding text. However, these problems are overcome by Parsons, Heffner, and contributors in **Pulmonary/Respiratory Therapy Secrets**. The basic theme of this text encourages clinicians in pulmonary medicine and respiratory care to solve patient problems by pondering pertinent questions related to a large variety of topics. With this in mind, the editors and contributors to this text present each chapter as a series of questions and answers by well known practitioners and educators. The text consists of 83 chapters divided into 18 sections covering everything from patient assessment to respiratory diseases and procedures. The typical chapter has 15 to 20 questions with concise answers from experts in the field. Illustrations and tables are frequently presented as part of an answer to assist the reader in developing a better understanding of the material. This style provides a stimulating approach to learning. It is relevant to this reviewer that the text focuses directly on the primary issues of pulmonary medicine and respiratory care today.

The intended audience of this work is medical students, residents, fellows, and experienced clinicians in pulmonary medicine and respiratory care. In my opinion, respiratory therapy students in the latter part of their program would also benefit from reading this text. A background in pulmonary anatomy and physiology, pharmacology, medical terminology, and pathology is essential for the reader to gain optimal benefit.

The book is well written and easy to read. Despite the large number of contributors, most chapters are written at a similar reading level and style. Some chapters are written with a stronger orientation to physicians than others; this may be a distraction for respiratory therapists. For example, in Chapter 14, The Pulmonary Artery Catheter, Question 17 on Page 79: "What does the physician need to know about transducers and line setup?" The provided answer is: "Physicians should be able to..." While the question and answer are pertinent to pose to physicians, they are equally pertinent for respiratory care practitioners (RCPs) and, therefore, should be worded in a more generic fashion to remain consistent with the rest of the book.

Most chapters are current, accurate, and thorough. For example, Chapter 7 by Dean Hess is a particularly strong essay on arterial blood gases. It addresses everything from sampling to interpretation of arterial blood gases as well as common concerns about sampling errors such as the potential impact of heparin on results. Chapter 19, Oxygen Therapy by Rebecca Meredith and James Stoller, is another example of excellent work. It addresses a variety of important concepts from indications for oxygen therapy to reimbursement issues. It is well referenced and written in a manner that is appealing to all clinicians who care for pulmonary patients. Other chapters that are exceptionally well done include Chapter 23 about Upper Airway Obstruction by John Stauffer and Chapter 25—Community-Acquired Pneumonia by Hugh Cassiere and Michael Niederman.

The only chapters I found to be too brief were Chapters 1 and 2 that covered bedside evaluation. Questions and discussions about key issues related to fever, sensorium, pedal edema, jugular venous distension, and extremity temperature were not presented. In addition, the discussion of lung sounds was inadequate, considering the intended audience. This section used out-dated terminology (eg, "crepitations", Page 6) and states that wheezes and rhonchi occur more often on inhalation and less often on exhalation, which is not accurate.

In summary, **Pulmonary/Respiratory Therapy Secrets** is a unique textbook intended to teach medical students, physicians, and respiratory care practitioners how to solve patient problems by contemplating pertinent questions and answers by experts. It is more 'fun' to learn from than the typical medical textbook. I can safely say it accomplishes its intended goal and would be an excellent addition to the library of educators, clinicians, and managers in pulmonary medicine and respiratory care. Who says reading textbooks by experts in the field has to be boring?

Robert L Wilkins PhD RRT
Professor of Cardiopulmonary Sciences
School of Allied Health Professions
Loma Linda University
Loma Linda, California

Respiratory Care Case Studies: The Therapist-Driven Protocol Approach, T Des Jardins, GG Burton, J Tietsort. Illustrations and photographs of chest radiographs, 254 pages, and tables. St Louis: Mosby-Year Book Inc, 1997. $24.95.

Therapist-driven protocols (TDPs) have been around since 1981.[1] They have gained increasing acceptance in recent years due to the ever-increasing pressure to reduce health care costs. TDP advantages include reducing health care costs and adding more timely and appropriate delivery of respiratory care services. One of the key elements of successful implementation of a TDP program is the involvement of a group of practitioners who are proficient in physical assessment and clinical problem solving. Respiratory care educators have recognized the need to develop these skills and have worked to include these concepts in their curricula, whether their students are respiratory care students or working practitioners. This book is an attempt to produce a useful tool to address this need.

An earlier work by French[2] (189 pages, includes simulated ventilator flowsheets; $39.95) has a similar purpose. However, its format is somewhat different in that the information-gathering and student-response formats are less structured. In addition, the cases terminate after the initial assessment is done and treatments are selected. The current work takes the learner down a longer path. The learner is forced to reassess and modify treatment 2 times after the initial workup. This allows for a more realistic experience because a practitioner rarely performs these tasks in the real world without some form of follow-up. Finally, French usually asks the learner to identify a working diagnosis, whereas Des Jardins et al give that information 'up front.' Either approach may be

appropriate depending on learning objectives, and either work is appropriate for the respiratory care practitioner desiring to become proficient at clinical problem solving.

Respiratory Care Case Studies begins with a section on how to most effectively use the book. The subjective data, objective data, assessment, and plan (SOAP) method of documenting a problem-oriented medical record is introduced, and examples are given to illustrate. Guidance is given for its use in an academic or clinical setting. (Kettenbach[3] provides a detailed examination of the SOAP note-taking techique.)

Next, an introduction to the concept of TDPs, emphasizing physical assessment and knowledge base, is given. Included in this section are helpful tables and diagrams that illustrate and reinforce the ideas discussed in the text. Especially useful are the algorithms detailing the pathophysiology and clinical manifestations of common pulmonary pathology. These algorithms are based on the anatomic alterations that occur as a result of these pathologies. This approach may make it easier for the learner to apply general pathophysiologic concepts to specific clinical cases. Each algorithm includes the general category of respiratory care required to treat each pathology.

The remainder of the text is composed of case studies categorized according to pulmonary disease type. Included are sections on obstructive airways, infectious, pulmonary vascular, environmental lung, neoplastic, diffuse alveolar, and chronic noninfectious parenchymal diseases, chest and pleural trauma, disorders of the pleura and chest wall, neurologic disorders and sleep apnea, near-drowning, smoke inhalation and thermal injuries, and postoperative atelectasis. Each case includes an admitting history and physical examination. The admitting histories frequently include psychosocial information about the patient that helps 'bring the patients to life' for the learner. For example, the patient with kyphoscoliosis is described in some detail as having had a rural upbringing. While some of the detail is relevant to the patient's health care, some is not. However, this type of detail allows the learner to get to know the patient and makes the case study more meaningful.

Technical detail about the patient's condition is certainly in depth. The learner is exposed to a wide range of assessment variables from vital signs to hemodynamic measurements. Each case includes a photograph of an admission chest radiograph. The interpretations of these films are given in the text. This provides for a full exercise in patient assessment. The authors may wish to consider follow-up chest x-rays for future editions rather than a single film per case. The learner is then provided with space to write their own SOAP notes based on the assessment information given. This could be done independently but may be more effective if done as a group project during which discussion would bring out differing points of view.

The book ends with a discussion of each case. Included in these discussions are the authors' idea of what the SOAP notes might look like and rationale for decisions made. Treatment decisions are generic, allowing for different but equally effective treatment regimens. For example, it is suggested that a patient with bronchospasm simply needs a bronchodilator. Specific drugs, dosages and frequencies are not suggested. Likewise, if an ordered therapy needs adjustment, the authors suggest that the therapy be "up- or down-regulated" based on need. Again, specific recommendations are not given. Treatment rationale discussions are frank, realistic opinions. They are reminiscent of discourse encountered on physician rounds.

This work is a welcome addition, and improvement, to the growing library on the application of clinical problem solving—a skill that is crucial to the delivery of safe and effective patient care. The implementation and development of training in this area would be enhanced through the use of this book and others like it.

Randy De Kler MS RRT
Georgia State University
Cardiopulmonary Care Sciences
Atlanta, Georgia

REFERENCES

1. Nielsen-Tietsort J, Poole B, Creagh CE, Repsher LE. Respiratory care protocol: an approach to in-hospital respiratory therapy. Respir Care 1981;26(5): 430-436.
2. French WA. Case profiles in respiratory care. Albany NY: Delmar Publishing, 1996.
3. Kettenbach G. Writing SOAP notes, 2nd ed. Philadelphia: FA Davis Co, 1995.

Letters

Letters addressing topics of current interest or material in RESPIRATORY CARE will be considered for publication. The Editors may accept or decline a letter or edit without changing the author's views. The content of letters as published may simply reflect the author's opinion or interpretation of information—not standard practice or the Journal's recommendation. Authors of criticized material will have the opportunity to reply in print. No anonymous letters can be published. Type letter double-spaced, mark it "For Publication," and mail it to RESPIRATORY CARE, 11030 Ables Lane, Dallas TX 75229-4593.

Asthma & SCUBA Diving

I am writing to ask that clear information and warnings be given to people with asthma (both newly diagnosed and chronic) concerning the potential risks of SCUBA (self-contained underwater breathing apparatus) diving. This concern stems from my husband's sudden death at age 47 from an asthmatic reaction subsequent to a relatively shallow SCUBA dive in Cancun, Mexico.

My husband was certified as a SCUBA diver in 1969 while in college. He had dived several times but not for approximately 20 years. My interpretation is that certified divers are expected to know their own health risks, and recertification and updating are generally not required. Few questions were asked of or warnings issued to my husband.

In his case, the dive instructor did indicate that asthma created some risk. However, my husband, because he had dived previously with no problem while an asthmatic and while using inhalers and was enough of a risk-taker to consider diving in the first place, underestimated the degree of risk.

I am asking here that all physicians and caregivers who treat people with asthma—and perhaps other lung diseases—tell their patients the degree of risk that SCUBA diving entails. The chronicity of asthma should be indicated as an additional risk. Even certified divers who have asthma should be asked to consult with their doctor prior to any dive. The standard waiver/release indicating that diving entails risks may be perceived as pro forma.

I believe that information about diving with asthma, communicated regularly between physician and patient, would save lives or avert the tragedy of injury. In a similar way, I believe that information should be included in the literature accompanying asthma inhalers.

Ginger E Benlifer PhD
Licensed Psychologist
Pound Ridge, New York

Editor's Note: My search of the recent literature suggests that no consensus exists regarding the likelihood of the occurrence of complications from SCUBA diving in asthmatics. Would-be divers with a history of asthma are advised to consult a medical professional who knows the issues and is qualified to provide advice that is specific to their present condition and their history. Resources for information include the Divers Alert Network, by phone (919) 684-8111; on the Internet, http://www.dan.ycg.org/; or by mail, Box 3823, Duke University Medical Center, Durham NC 27710.

Kudos to Authors

A Continuing Role in the ICU

I read with interest Dean R Hess's article "The Role of the Respiratory Therapist in the Intensive Care Unit."[1] I appreciate the high praise Dr Hess gave respiratory therapists in general. I believe that respiratory therapists can make a pivotal difference in a critically ill patient's outcome if they are given the opportunity. As a respiratory care student, I know my education background is solid in technology and physiology. Patient assessment and evaluation have also been strongly emphasized in our respiratory care program. From my perspective, Dr Hess was on target.

Jinnyi L Walker
Respiratory Care Student
Morganfield, Kentucky

REFERENCES

1. Hess DR. The role of the respiratory therapist in the intensive care unit. Respir Care 1997; 42(1):116-126.

Capnography—Another Tool

I would like to congratulate John M Graybeal on his editorial on "Capnography: A Key to Understanding Physiology."[1] Although we are not now using capnography in the hospital in which I work, I am interested in its use in the intensive care setting. I believe that having the equipment to monitor $P_{et(CO_2}$ would be a great advantage. Mr Graybeal's editorial helped me understand capnography physiology.

I did not realize that capnography had been available for "more than 50 years," and I believe that studies of capnography should be continued. Indeed, "we need to recognize the importance of the capnograph, especially the analysis of the capnographic waveform and the relationship between the exhaled CO_2 and the arterial CO_2 tensions."

We respiratory therapists have an obligation to our patients to continue to study and research ways to perform better in our field. Our knowledge and ability to realize the clinical importance of what is going on in our environment will help us perform better in the respiratory field and to prove that we as respiratory care specialists know our job best.

Kimberly Watkins
Providence, Kentucky

REFERENCES

1. Graybeal JM. Capnography—A Key to Understanding Physiology (editorial). Respir Care 1997;42(2):200-201.

Graphics & Patient Assessment

I read with great interest "Disaster Avoided? Cues from the Flow Signal."[1]

The case presented in the article was an excellent example of early intervention provided by graphics display. The flow, volume, and pressure waveforms depicted a serious problem within the patient. The origin of that problem was the issue. Analysis of the graphics allowed for a conclusion to be made more easily. The article explains that "biphasic exhalation coupled with periodically rising peak pressure and breath stacking suggest partial obstruction." What would be better than being able to see those occurrences while they are taking place? This provides a perfect opportunity for us as therapists to step in and analyze the situation and utilize graphics, to draw a conclusion.

I believe that graphics can unlock a door to a new future for respiratory therapists everywhere. The more of our senses we use to assess our patients the better will be our patient care. As respiratory therapists our speciality is assessing the respiratory system and

working toward recovery. What better way than with graphics!

Summer Garrett
Respiratory Care Student
Henderson, Kentucky

REFERENCES

1. Hargett K, Nilsestuen JO, Hayes S. Disaster avoided? cues from the flow signal. Respir Care 1996;41(12):1123-1124.

Emergency Room Staffing

I am writing in regard to the article in the January '97 issue of Respiratory Care entitled "Role of the Respiratory Care Practitioner in the Emergency Department."[1] I am currently an RCP in a 400-bed hospital where we use pagers and assign one RCP to the ED and another to help if it gets too busy. This is in addition to the floor work that we are assigned. Our response time seems satisfactory most of the time; however, we sometimes slip due to a busy schedule. I admire the idea of cross training an RCP specifically to the ED. Members of our department—myself included—are interested in trying this. Can this be justified financially in a hospital of our size considering that we will have to add another person to our staff each shift? How can we estimate a 'break-even' or determine cost-effectiveness?

Christy Murray
Respiratory Care Student
Livermore, Kentucky

REFERENCES

1. Branson RD, Meredith R. Role of the respiratory care practitioner in the emergency department. Respir Care 1997;42(1): 141-147.

Editor's Note: In addition to responding to this column by writing a letter for publication, AARC members can make good use of our web page to ask and answer questions such as the one posed by Ms Murray. Questions of interest to the profession can be posted to the AARC Help Line in the Members Only section. Any member can post a question or answer a question. Check it out at http://www.aarc.org!

43rd International Respiratory Congress
December 6-9 • New Orleans, Louisiana

Announcing

Mechanical Ventilation

principles and applications

6th Annual Course

- *Highlights of recent developments*
- *"Hands-on" small group workshops*
- *Close faculty interaction*
- *Intensive tutorials*

September 11-14, 1997

Minneapolis, Minnesota, USA

Course director: John J. Marini, MD

Guest lecturers:

John Bach, MD
Lluis Blanch, MD
Richard Branson, RRT
Robert M. Kacmarek, PhD, RRT
Theodore W. Marcy, MD
Alan Morris, MD
David J. Pierson, MD
Michael Pinsky, MD
Andrea Rossi, MD
Jean Jacques Rouby, MD
Jesus Villar, MD

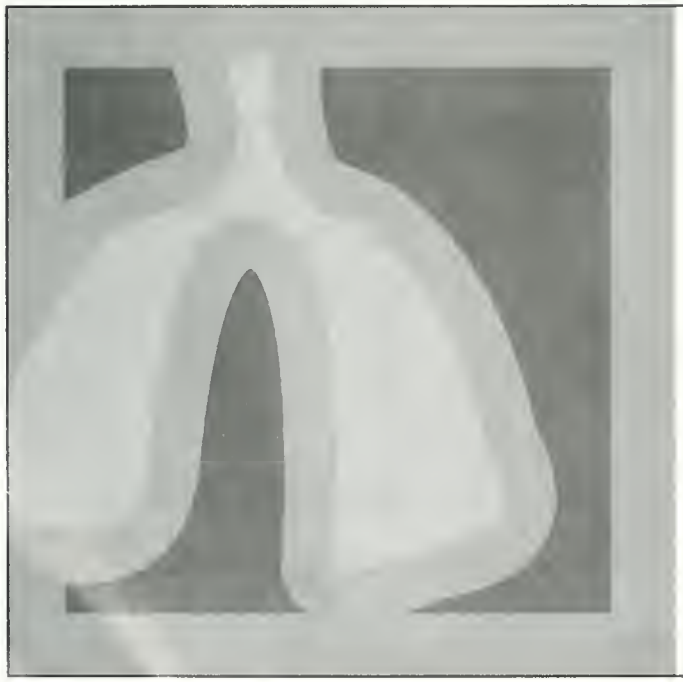
For further information, contact Continuing Medical Education, University of Minnesota, 107 Radisson Hotel Metrodome, 615 Washington Avenue SE, Minneapolis, Minnesota 55414 (USA) Telephone (612)626-7600; FAX: (612)626-7766 Fax on Demand: 1-888-223-5868

Circle 102 on reader service card

Keep abreast of the latest research in RESPIRATORY CARE!

Subscribe Today!

Make checks payable to RESPIRATORY CARE (see last page for rates), and mail to the subscription office at 11030 Ables Lane Dallas, Texas 75229-4593.



Turn Your Case Report into a Teaching Feature:

- Test Your Radiologic Skill
- Blood Gas Corner
- Graphics Corner
- Kittredge's Corner
- PFT Corner
- Cardiorespiratory Interactions
- Drug Capsule

Call the Editorial Office at (972) 243-2272 for information, or see the Manuscript Preparation Guide in this issue.

MEDWATCH

THE FDA MEDICAL PRODUCTS REPORTING PROGRAM

For VOLUNTARY reporting by health professionals of adverse events and product problems

Form Approved OMB No. 0910-0291 Expires 4/30/96
See OMB statement on reverse

FDA Use Only (Resp Care)

Triage unit sequence #

A. Patient information

1 Patient identifier

In confidence

2 Age at time of event: or Date of birth:

3. Sex ☐ female ☐ male

4 Weight ____ lbs or ____ kgs

B. Adverse event or product problem

1. ☐ Adverse event and/or ☐ Product problem (e.g., defects/malfunctions)

2 Outcomes attributed to adverse event (check all that apply)

☐ death ____ (mo/day/yr)
☐ life-threatening
☐ hospitalization – initial or prolonged
☐ disability
☐ congenital anomaly
☐ required intervention to prevent permanent impairment/damage
☐ other:

3 Date of event (mo/day/yr)

4 Date of this report (mo/day/yr)

5. Describe event or problem

6. Relevant tests/laboratory data, including dates

7 Other relevant history, including preexisting medical conditions (e.g., allergies, race, pregnancy, smoking and alcohol use, hepatic/renal dysfunction, etc.)

C. Suspect medication(s)

1 Name (give labeled strength & mfr/labeler, if known)

#1

#2

2. Dose, frequency & route used

#1

#2

3 Therapy dates (if unknown, give duration) (from/to or best estimate)

#1

#2

4 Diagnosis for use (indication)

#1

#2

5. Event abated after use stopped or dose reduced

#1 ☐ yes ☐ no ☐ doesn't apply

#2 ☐ yes ☐ no ☐ doesn't apply

6 Lot # (if known)

#1

#2

7 Exp. date (if known)

#1

#2

8 Event reappeared after reintroduction

#1 ☐ yes ☐ no ☐ doesn't apply

#2 ☐ yes ☐ no ☐ doesn't apply

9 NDC # (for product problems only)

– –

10. Concomitant medical products and therapy dates (exclude treatment of event)

D. Suspect medical device

1 Brand name

2 Type of device

3. Manufacturer name & address

4 Operator of device
☐ health professional
☐ lay user/patient
☐ other

5 Expiration date (mo/day/yr)

6.
model #
catalog #
serial #
lot #
other #

7 If implanted, give date (mo/day/yr)

8 If explanted, give date (mo/day/yr)

9 Device available for evaluation? (Do not send to FDA)
☐ yes ☐ no ☐ returned to manufacturer on ____ (mo/day/yr)

10 Concomitant medical products and therapy dates (exclude treatment of event)

E. Reporter (see confidentiality section on back)

1 Name & address

phone #

2 Health professional? ☐ yes ☐ no

3. Occupation

4 Also reported to
☐ manufacturer
☐ user facility
☐ distributor

5. If you do NOT want your identity disclosed to the manufacturer, place an " X " in this box. ☐

FDA

Mail to: MEDWATCH
5600 Fishers Lane
Rockville, MD 20852-9787

or FAX to:
1-800-FDA-0178

FDA Form 3500 1/96)

Submission of a report does not constitute an admission that medical personnel or the product caused or contributed to the evr

ADVICE ABOUT VOLUNTARY REPORTING

Report experiences with:

- medications (drugs or biologics)
- medical devices (including in-vitro diagnostics)
- special nutritional products (dietary supplements, medical foods, infant formulas)
- other products regulated by FDA

Report SERIOUS adverse events. An event is serious when the patient outcome is:

- death
- life-threatening (real risk of dying)
- hospitalization (initial or prolonged)
- disability (significant, persistent or permanent)
- congenital anomaly
- required intervention to prevent permanent impairment or damage

Report even if:

- you're not certain the product caused the event
- you don't have all the details

Report product problems – quality, performance or safety concerns such as:

- suspected contamination
- questionable stability
- defective components
- poor packaging or labeling
- therapeutic failures

How to report:

- just fill in the sections that apply to your report
- use section C for all products except medical devices
- attach additional blank pages if needed
- use a separate form for each patient
- report either to FDA or the manufacturer (or both)

Important numbers:

- 1-800-FDA-0178 to FAX report
- 1-800-FDA-7737 to report by modem
- 1-800-FDA-1088 to report by phone or for more information
- 1-800-822-7967 for a VAERS form for vaccines

If your report involves a serious adverse event with a device and it occurred in a facility outside a doctor's office, that facility may be legally required to report to FDA and/or the manufacturer. Please notify the person in that facility who would handle such reporting.

Confidentiality: The patient's identity is held in strict confidence by FDA and protected to the fullest extent of the law. The reporter's identity, including the identity of a self-reporter, may be shared with the manufacturer unless requested otherwise. However, FDA will not disclose the reporter's identity in response to a request from the public, pursuant to the Freedom of Information Act.

The public reporting burden for this collection of information has been estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to.

DHHS Reports Clearance Office
Paperwork Reduction Project (0910-0291)
Hubert H. Humphrey Building Room 531-H
200 Independence Avenue S.W.
Washington, DC 20201

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number

Please do NOT return this form to either of these addresses.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service • Food and Drug Administration

FDA Form 3500-back

Please Use Address Provided Below – Just Fold In Thirds, Tape and Mail

Department of Health and Human Services
Public Health Service
Food and Drug Administration
Rockville, MD 20857

Official Business
Penalty for Private Use $300

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES OR APO/FPO

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 946 ROCKVILLE, MD

POSTAGE WILL BE PAID BY FOOD AND DRUG ADMINISTRATION

MEDWATCH
The FDA Medical Products Reporting Program
Food and Drug Administration
5600 Fishers Lane
Rockville, MD 20852-9787

Not-for-profit organizations are offered a free advertisement of up to eight lines to appear, on a space-available basis, in Calendar of Events in RESPIRATORY CARE. Ads for other meetings are priced at $5.50 per line and require an insertion order. Deadline is the 20th of the month two months preceding the month in which you wish the ad to run. Submit copy and insertion orders to Calendar of Events, RESPIRATORY CARE, 11030 Ables Lane, Dallas TX 75229-4593.

Calendar of Events

AARC & Affiliates

June 11–13—Illinois Society
29th Annual Convention, "Healthcare's Multi-Skilled Players," at the Indian Lakes Resort, Bloomingdale, Illinois.
Contact: Larry Dastych at (847) 618-7710.

June 24—Live Video Conference
"Asthma Disease Management: Using the Revised NAEPP Guidelines in Practice," Part 4 of the AARC's 1997 "Professor's Rounds," airs from 12:30 to 2 PM Eastern Time.
CRCE: 1 credit hour.
Contact: The AARC at (972) 243-2272.

July 15—Live Video Conference
"Initial Treatment for the Pediatric Patient in Respiratory Distress," Part 5 of the AARC's 1997 "Professor's Rounds," from 12:30 to 2 PM Eastern Time.
CRCE: 1 credit hour.
Contact: The AARC at (972) 243-2272.

July 16—Live Telephone Question-and-Answer Session
View "Asthma Disease Management: Using the Revised NAEPP Guidelines in Practice," Part 4 of the AARC's 1997 "Professor's Rounds," and participate in a live telephone question-and-anser session from 12:30 to 1 PM Eastern Time.
CRCE: 1 credit hour.
Contact: To receive the videotape and register for the teleconference, call the AARC at (972) 243-2272.

August 6–8—New Mexico Society
Annual convention, "At the Hop," at the Albuquerque Convention Center, Albuquerque, New Mexico.
Contact: Brooke Patterson, VA Hospital, (505) 265-1711, ext 4998.

August 20—Live Telephone Question-and-Answer Session
View "Initial Treatment for the Pediatric Patient in Respiratory Distress," Part 5 of the AARC's 1997 "Professor's Rounds" and participate in a live telephone question-and-answer session from 12:30 to 1 PM Eastern Time.
CRCE: 1 credit hour.
Contact: To receive the videotape and register for the teleconference, call the AARC at (972) 243-2272.

August 21—Ohio Society
Annual Critical Care Seminar, "Rock-n-Roll and Respiratory Care," hosted by MetroHealth Medical Center, Cleveland, Ohio.
Contact: Bob Messenger at (216) 778-3226 or e-mail bmessenger@mhmc.org.

Other Meetings

June 13—Jefferson Medical College & Thomas Jefferson University Hospital, Department of Patient Care Services
First Annual Jefferson Ventilator Management Seminar, Philadelphia, Pennsylvania
Contact: Call (888) JEFF-CME or (215) 955-6992, or fax (215) 923-3212.

June 29–July 3—The American College of Chest Physicians (ACCP)
6th Critical Care Medicine Review at the San Diego Marriott Hotel and Marina, San Diego, California.
Contact: ACCP Product and Registration Services, 3300 Dundee Rd, Northbrook IL 60062, (800) 343-2227, (847) 498-1400, fax (847) 498-5460, e-mail: registration@chestnet.org.

July 25–26—The Joint Commission on Accreditation of Healthcare Organizations
"Positioning Home Care and Hospice for Excellence in the 21st Century," third National Conference and Exhibition for Home Care and Hospice at the Drake Hotel, Chicago, Illinois. The fee is $375 for participants registering by May 30 ($450 after May 30), with a $25 discount for additional registrants from the same organization.
Contact: Joint Commission's Customer Service Center at (630) 792-5800.

Exciting. Informative. A Rea

"Professor's Rounds" conferences are unique opportunities for you and your staff to learn from some of the most skilled, knowledgeable, and successful people in health care. Leaders. People who know what is happening in health care—Sheryl Haneckow, Thomas Kallstrom, Barbara Wilson, Gretchen Lawrence, Jan Nilsestuen, and Sam Giordano.

Literally thousands of health care professionals will view these programs and earn continuing education credit. You'll learn new tactics and strategies for the new era of health care. Subscribing to "Professor's Rounds" will sove you months of reading, listening, digging, comparing, and learning about the new health care and technologies and procedures. Register now for an exciting and informative journey.

Videotape Teleconferences

Everyone in your facility can earn one hour of continuing education credit for each "Professor's Rounds" program. You are provided with a 90-minute videotape to view prior to o live 30-minute telephone question-and-answer session with the expert. The only equipment required is a VHS videotape player, o television monitor, and a telephone/speaker phone. The registration fee for the Video Teleconference does not include the Live Television Videoconference.

I. Mechanical Ventilation: Managing Tubes and Aerosols
April 15, 12:30–1 p.m. Eastern Time, 9:30 a.m. Pacific Time
Approved for One Hour of Continuing Educotion Credit

II. Waveform Analysis and Interpretation
May 21, 12:30–1 p.m. Eastern Time, 9:30 o.m. Pocific Time
Approved for One Hour of Continuing Education Credit

III. JCAHO Prablematic Areas for Respiratory Care Services
June 9, 12:30–1 p.m. Eastern Time, 9:30 a.m. Pocific Time
Approved for One Hour of Continuing Education Credit

IV. Asthma Disease Management: Using the Revised NAEPP Guidelines in Practice
July 16, 12:30–1 p.m. Eostern Time, 9:30 o.m. Pocific Time
Approved for One Hour of Continuing Education Credit

V. Initial Treatment for the Pediatric Patient in Respiratory Distress
August 20, 12:30–1 p.m. Eastern Time, 9:30 o.m. Pacific Time
Approved for One Hour of Continuing Educotion Credit

VI. Nitric Oxide: Issues and Answers
September 8, 12:30–1 p.m. Eostern Time, 9:30 o.m. Pacific Time
Approved for One Hour of Continuing Education Credit
Supported in part by an educational grant from
Sievers Instruments Inc./Pulmonox Medical Corporation

VII. Reimbursement: Solving the Puzzle
November 3, 12:30–1 p.m. Eastern Time, 9:30 o.m. Pocific Time
Approved for One Hour of Continuing Educotion Credit

VIII. Marketing Services to Managed Care Organizations: Not Just for Managers
December 1, 12:30–1 p.m. Eastern Time, 9:30 o.m. Pacific Time
Approved for One Hour of Continuing Education Credit

Live Television Videoconferences

You and each member of your staff can earn one hour of continuing education credit for each "Professor's Rounds" program without leoving your facility. Each live 90-minute program is interactive to give you the opportunity to ask questions and discuss the issues further. Earn continuing education credit by viewing the program live or by tape delay. You will need satellite reception capabilities (KU analog or C Bond) and o viewing room with a video monitor and telephone. The registration fee for the Live Television Videoconference does not include the Video Teleconference.

I. Mechanical Ventilation: Managing Tubes and Aerosols
March 18, 12:30–2 p.m. Eastern Time, 9:30 a.m. Pacific Time
Approved for One Hour of Continuing Educotion Credit

II. Waveform Analysis and Interpretation
April 29, 12:30–2 p.m. Eastern Time, 9:30 a.m. Pocific Time
Approved for One Hour of Continuing Education Credit

III. JCAHO Problematic Areas for Respiratory Care Services
May 20, 12:30–2 p.m. Eostern Time, 9:30 o.m. Pocific Time
Approved for One Hour of Continuing Education Credit

IV. Asthma Disease Management: Using the Revised NAEPP Guidelines in Practice
June 24, 12:30–2 p.m. Eostern Time, 9:30 o.m. Pocific Time
Approved for One Hour of Continuing Education Credit

V. Initial Treatment for the Pediatric Patient in Respiratory Distress
July 15, 12:30–2 p.m. Eastern Time, 9:30 a.m. Pacific Time
Approved for One Hour of Continuing Education Credit

VI. Nitric Oxide: Issues and Answers
August 26, 12:30–2 p.m. Eastern Time, 9:30 a.m. Pacific Time
Approved for One Hour of Continuing Educotion Credit
Supported in part by an educational grant from
Sievers Instruments Inc./Pulmonox Medical Corporation

VII. Reimbursement: Solving the Puzzle
October 14, 12:30–2 p.m. Eastern Time, 9:30 a.m. Pacific Time
Approved for One Hour of Continuing Educotion Credit

VIII. Marketing Services to Managed Care Organizations: Not Just for Managers
November 11, 12:30–2 p.m. Eastern Time, 9:30 a.m. Pacific Time
Approved for One Hour of Continuing Educotion Credit

Videotapes

Videotapes of the programs will be available after each Live Television Videoconference. Sites purchasing videotapes only do not earn continuing educotion credit. To earn continuing education, participants must view the program ot a site registered for the Live Television Videoconference or the Video Teleconference. If you have any questions, please call (972) 243-2272.

Accreditation

Each staff member completing CRCE requirements earns one continuing education credit for participoting in each program in the 1997 "Professor's Rounds" series. If you subscribe to the entire series, you and staff members can each earn a total of eight continuing educotion credits. However, participants must view the program at a site registered for a Live Television Videoconference or at a site registered for a Videotape Teleconference in order to receive credit. Videotape-only purchasers do not qualify for continuing education credit.

Requirements

Live Television Videoconference—You will need satellite reception capabilities, o viewing room, o television monitor, and o telephone. Registration fee is for the live television broadcost only. It does not include both the Live Television Videoconference and Videotape Teleconference.

Videotape Teleconference—A videotape of the programs is provided to registered Videotape Teleconference sites after the live program. The only equipment required is a VHS videotape player, a television monitor, and o telephone/speaker phone. Registration fee is for the Videotape Teleconference only. It does not include both the Videotape Teleconference and Live Television Videoconference.

Videotapes Only—Videotapes of the program will be ovoilable after the live television broadcast. Note: Purchasers of videotapes only are not eligible for continuing education credit.

Eye-Opener. Probably All Three.

1997 "Professor's Rounds" Registration Form

To register, please complete the form below. *Make checks payable to the AARC.* Mail registration form to: American Association for Respiratory Care, AARC Videoconferences, 11030 Ables Lane, Dallas, Texas 75229-4593. Purchase orders and credit card orders may be faxed to (972) 484-2720 or (972) 484-6010.

Method of Payment: ☐ Check enclosed in the amount of $_____ ☐ Purchase Order Number _____

Bill my credit card: ☐ Visa ☐ MasterCard

Card Number _____ Expiration Date _____ Signature X _____

AARC Member Number _____

Name _____ Title _____

Institution _____

Billing Address _____

City/State/Zip _____ Telephone Number (_____) _____

Send Program Materials to (if different from above):

Please provide street address for UPS shipments. No Post Office boxes.

Name _____ Title _____

Institution _____

Street Address _____

City/State/Zip _____ Telephone Number (_____) _____

Site Registration (select one only): ☐ Live Television Videoconference or ☐ Videotape Teleconference or ☐ Videotape Only

Subscription rates *do not include both* the Live Television Videoconference Program and Videotape Teleconference Program. Each requires a separate registration fee. Registration includes connection information, course material, and CRCE packet (for live and teleconference programs).

AARC Member Rates:	☐ 1 program = $275	☐ 2 programs = $550 ($275 each)	☐ 3 programs = $825 ($275 each)	☐ 4 programs = $824 ($206 each)
	☐ 5 programs = $1,030 ($206 each)	☐ 6 programs = $1,236 ($206 each)	☐ 7 programs = $1,442 ($206 each)	☐ 8 programs = $1,104 ($138 each)
Nonmember Rates:	☐ 1 program = $330	☐ 2 programs = $660 ($330 each)	☐ 3 pragrams = $990 ($330 each)	☐ 4 programs = $988 ($247 each)
	☐ 5 programs = $1,235 ($247 each)	☐ 6 programs = $1,482 ($247 each)	☐ 7 programs = $1,729 ($247 each)	☐ 8 programs = $1,320 ($165 each)

Programs: ☐ Program I ☐ Program II ☐ Program III ☐ Program IV ☐ Program V ☐ Program VI ☐ Program VII ☐ Program VIII

Reception Via (if subscribing to live program): ☐ KU analog ☐ C Band

New Products & Services

News releases about new products and services will be considered for publication in this section. There is no charge for these listings. Send descriptive release and glossy black and white photographs to RESPIRATORY CARE Journal, New Products and Services Dept, 11030 Ables Lane, Dallas TX 75229-4593

POSITIVE EXPIRATORY PRESSURE DEVICE. HealthScan discloses the Threshold™ PEP. According to a HealthScan press release, the device's design uses a flow-independent one-way valve to ensure consistent expiratory pressure resistance. The pressure resistance is adjustable in increments of 1 cm H_2O and ranges from 4-20 cm H_2O—a clearly marked scale is located on the outside of the unit. The device may be used to help open the airways and in the expulsion of mucus during the forced expiratory technique. Made of durable, high-impact acrylic, the unit is easy to clean and can be used with a mouthpiece or mask, nebulizer or spacer. To receive information, circle Reader Service Number 160.

NO/NO_2 MONITOR & PRINTER. Micro Direct Inc reports the availability of the PrinterNOx Nitric Oxide (NO)/Nitrogen Dioxide (NO_2) monitor. According to company literature, the device simultaneously monitors NO and NO_2 with a resolution of 0.1 ppm. The monitor uses a built-in side stream sampling system and is equipped with an internal pump, integral printer, upper and lower alarms, and calibration. The monitor uses either rechargeable batteries or a standard electrical outlet for its power source. Data from the monitor can be downloaded to a personal computer via the RS-232 port. Circle Reader Service Number 161 for more information from Micro Direct.

PULSE OXIMETER. The Nellcor Puritan Bennett handheld pulse oximeter NPB-40 is now available. The NPB-40 is a portable oxygen saturation monitoring device particularly designed to be durable and convenient for a variety of settings, the manufacturer says. The oximeter operates on 4 AA-sized batteries and has an easy-to-see display and a keypad for access to all functions. The oximeter comes with a Durasensor® finger clip sensor and is compatible with other Nellcor Puritan Bennett adhesive and reusable sensors. For details about the oximeter usable in adult, pediatric, and neonatal patients, circle Reader Service Number 162.

INSTRUMENT RECEPTACLE. A newly designed instrument receptacle, the C-Tub, is provided by Cetylite Industries Inc. The C-Tub is made of durable plastic and is large enough to hold various sized instruments for disinfection or sterilization. The company also says that the receptacle is tapered to take up less counter space, has well-positioned handles, and a clear lid. The inner basket does not touch the bottom of the C-Tub, allowing for the drainage of debris from instruments. A smaller basket is also available. For details, circle Reader Service Number 163.

LUBRICANT ANTI-ADHESIVE. Cetylite Industries Inc unveils Release—an anti-adhesive and lubricant for medical and dental use. Release is a nontoxic, nonflammable aerosol that provides a protective coating for medical instruments. According to the company, a thin coating of Release applied to bowls, flasks, syringes, forceps, scissors, clamps, and other equipment prevents the sticking of composites and the build-up of amalgam to carriers. The product is compatible with most surfaces and materials, may inhibit tarnishing and discoloration, and contains no petroleum distillates or silicones. Release is packaged in 16.5 oz. aerosol containers. Details are available; circle Reader Service Number 164.

Wallace
34 mL
NDC 0037-0241-10
Astelin
Nasal Spray
(azelastine HCl) 137 mcg
200 METERED SPRAY DISPENSING PACKAGE
Contains two 17 mL bottles and one spray pump unit. Each bottle contains 100 metered sprays
FOR INTRANASAL USE ONLY
Each spray delivers 0.137 mL (137 mcg azelastine hydrochloride)
Caution: Federal law prohibits dispensing without prescription

ANTIHISTAMINE NASAL SPRAY. Wallace Laboratories debuts Astelin (azelastine HCl) Nasal Spray, 137 mcg. According to company literature, Astelin —an antihistamine nasal spray for the treatment of symptoms of allergic rhinitis— was cleared by the U.S. Food and Drug Administration in November 1996. The spray may be used to treat allergic rhinitis, rhinorrhea, sneezing, and nasal pruritus in adults and children older than

12 years; the recommended dose is 2 sprays in each nostril twice daily. Astelin may also be used in patients with concomitant asthma or by those who are taking antihistamines, nasal steroids, decongestants, or theophylline. For more information about indications and contraindications, circle Reader Service Number 165.

NASAL HUMIDIFIERS. Pulmonary Products Corporation introduces the Nasal Cannula Hygroscopic Humidifier. The cannula is for patients who use E cylinders or receive oxygen via cannula. The company says that the cannula is less expensive and more comfortable than water humidification and can be used with oxygen flows of 1-6 L/min. The cannula contains an antibacterial material that reduces bacterial build-up. For details, circle Reader Service Number 166.

ANTILEUKOTRIENE ASTHMA TABLETS. Abbott Laboratories announces Zyflo™ (zileuton), a U.S. Food-and-Drug-Administration-approved 600-mg tablet for the treatment of asthma. Zyflo is recommended for patients 12 years old and older. According to Abbott literature, the tablets work by inhibiting the formation of leukotrienes that may contribute to inflammation, edema, bronchoconstriction, and mucus secretion in the airways of asthma patients. For a complete pharmacologic description, dosage recommendations, indications, and contraindications, circle Reader Service Number 167.

ASPIRATOR. Precision Medical releases the Easy/Vac Aspirator. The company claims that the aspirator is suitable for clinical or home care use, uses a 1/5 horsepower pump, features 2 hydrophobic filters—one in-line to prevent contamination by aerosolized microorganisms and the other to prevent back flow of fluid and airborne contaminants, and a dual compressor system. Further, the Easy/Vac comes with a 5-year warranty. For details about the aspirator, circle Reader Service Number 168.

AIR FILTER. Champion Laboratories, a manufacturer of Kleener® cabin air filters for automobiles, announces replacement filters particularly suited for the 1996 and later Ford Taurus/Mercury Sable, Lincoln Continental, and 1995 and later Ford Contour/Mercuy Mystique. The filters, claim the company, remove air pollutants and allergens from the outside air, preventing most from entering the automobile cabin through the heating, air conditioning, or fresh air system. The filters are available from local dealerships. Circle Reader Service Number 169 for details.

PULSE OXIMETER. Respironics Inc releases a small lightweight oximeter—the Cricket Recording Pulse Oximeter. Respironics says that the Cricket records a patient's oxygen saturation, finger movement, and heart rate for up to 24 hours. In addition, audible and visible alarms alert the patient or caregiver when blood oxygen saturation falls below a selected level or if the heart rate deviates from a preselected range. Data can be displayed numerically on the LCD or graphically on an IBM-type computer. For more information about this complete monitoring system, circle Reader Service Number 170.

GLUTARALDEHYDE SOAKING STATION. PCI Medical Inc discloses its new large-capacity mobile Glutaraldehyde Soaking Station. An advanced ductless hood draws fumes away from the operator and into a carbon filter where the fumes are neutralized, the manufacturer says. The system uses a low-noise blower system, a low amount of energy, and a built-in disposal system. The station is available in 4 sizes with a choice of bowls ranging from 5-50 gallons. An optional heating system is available. Circle Reader Service Number 171 for information.

Notices

Notices of competitions, scholarships, fellowships, examination dates, new educational programs, and the like will be listed here free of charge. Items for the Notices section must reach the Journal 60 days before the desired month of publication (January 1 for the March issue, February 1 for the April issue, etc). Include all pertinent information and mail notices to RESPIRATORY CARE Notices Dept, 11030 Ables Lane, Dallas TX 75229-4593.

ASTM Standards via Fax

The American Society for Testing and Materials (ASTM) now offers WEBFAXX, a new option available at http://www.astm.org in the "Search for Standards" area. Copies of the standards, once requested, can be sent within 10 minutes to any fax machine. The copies cost $0.75 in the United States, Canada, and Mexico and $1.50 in all other countries.

Research Grants Available for Health Economics & Outcomes Studies

Researchers can receive $5,000 to $100,000 from Hoechst Marion Roussel for full or partial funding of studies in cardiovascular diseases, neuroscience, oncology, respiratory diseases, endocrinology, rheumatology, and infectious diseases.

To be eligible, research should advance knowledge in health outcomes research, or investigate health outcomes related to a specific therapeutic domain or product, or compare a specific therapeutic domain or product to another intervention. Proposals are being accepted through August 15, and recipients will be selected in October.

For information, contact ACCORD coordinator Mary Miller, Hoechst Marion Roussel, Mail Station J3-M1728, 10236 Marion Park Drive, Kansas City MO 64137-1405, call (816) 966-3780.

E-mail the Editorial Office

Pat Brougher, Editor	**brougher@aarc.org**
Kris Williams, Assistant Editor	**williams@aarc.org**
Linda Barcus, Editorial Assistant	**barcus@aarc.org**

Helpful Web Sites

American Association for Respiratory Care
http://www.aarc.org

National Board for Respiratory Care
http://www.nbrc.org

Applied Measurement Professionals Inc
http://www.applmeapro.com

Extracorporeal Life Support Organization
http://www.med.umich.edu/elso/

Food and Drug Administration
http://www.fda.gov

National Asthma Education Prevention Program Guidelines, 2nd Edition
http://www.nhlbi.nih.gov/nhlbi/lung/asthma/prof/asthgdln.htm

Tuberculosis Information
http://www.umdnj.edu/ntbc

The Lambda Beta Society

The National Honor Society for the Profession of Respiratory Care

For information about the Lambda Beta Society—

the National Honor Society for the

Profession of Respiratory Care,

contact the Society Office at

1701 W Euless Blvd, Suite 200, Euless TX 76040

(817)283-4269.

The National Board for Respiratory Care—1997 Examination Dates and Fees

Examination	Examination Date	Examination Fee	
CRTT Examination	March 8, 1997	$ 100	(new applicant)
	Application Deadline: January 1, 1997	60	(reapplicant)
	July 12, 1997	100	(new applicant)
	Application Deadline: May 1, 1997	60	(reapplicant)
	November 8, 1997	100	(new applicant)
	Application Deadline: September 1, 1997	60	(reapplicant)
RRT Examination	June 7, 1997	100	Written only (new applicant)
	Application Deadline: February 1, 1997	60	Written only (reapplicant)
		110	CSE only (all applicants)
	December 6, 1997	210	Both (new applicant)
	Application Deadline: August 1, 1997	170	Both (reapplicant)
CPFT Examination	June 7, 1997	110	(new applicant)
	Application Deadline: April 1, 1997	80	(reapplicant)
RPFT Examination	December 6, 1997	160	(new applicant)
	Application Deadline: September 1, 1997	130	(reapplicant)
Perinatal/Pediatric Respiratory Care Specialty Examination	March 8, 1997	160	(new applicant)
	Application Deadline: November 1, 1996	130	(reapplicant)

For information about other services or fees, write to the
National Board for Respiratory Care, 8310 Nieman Road, Lenexa KS 66214, or call (913) 599-4200, FAX (913) 541-0156, email nbrc-info@nbrc.org.

Summer Forum

Phoenix, Arizona
July 25-27

Program & registration information available in the April 1997 AARC Times
or on our website at www.aarc.org

Authors in This Issue

Benlifer, Ginger E 652
Cardinal, Pierre 604
De Kler, Randy 650
Djunaedi, Hélène 604
Fluck, Robert R Jr 599
Garrett, Summer 652
Greffe-Laliberté, Ginette 604
Hess, Dean R 601
Johnson, Larry E 611
Jones, Gwynne 604
Jung, Sarah J 620
Kues, John R 611
Murray, Christy 653
Pfaff, Karen M 611
Pham, Ba' 604
Savage, Phillip J 611
Snell, Cathy Carter 604
Walker, Jinnyi L 652
Wallace, Wayne 617
Watkins, Kimberly 652
Wilkins, Robert L 650
Williams, Kris 601
Wilson, Teri Nikolai 648

Advertisers in This Issue

To advertise in RESPIRATORY CARE, contact Tim Goldsbury, 20 Tradewinds Circle, Tequesta FL 33469 at (561) 745-6793, Fax (561) 745-6795, email: timo2 6907@aol.com, for rates and media kits. For recruitment/classified advertising contact RESPIRATORY CARE's Marketing Assistant, Beth Binkley, at (972) 243-2272, Fax (972) 484-6010. Dale Griffiths is RESPIRATORY CARE's Marketing Director.

California College for Health Sciences 585
Circle Reader Service No. 136 Call (800) 961-6409
DHD Healthcare 577
Circle Reader Service No. 109 Call (800) 847-8000
Disease Management Congress 598
Circle Reader Service No. 132 Call (888) 446-6422
Healthdyne Technologies 578
Circle Reader Service No. 119 Call (800) 421-8754
HealthScan Products Inc 583
Circle Reader Service No. 108 Call (800) 962-1266
Nellcor Puritan Bennett 580
Circle Reader Service No. 114 Call (800) NELLCOR
NovaMetrix Medical Systems Inc ..... Cover 3
Circle Reader Service No. 121 Call (800) 243-3444
Sherwood Medical ..... Cover 4
Circle Reader Service No. 157 Call (800) 325-7472
University of Minnesota 654
Circle Reader Service No. 102 Call (612) 626-7600

COPYRIGHT INFORMATION. RESPIRATORY CARE is copyrighted by Daedalus Enterprises Inc. Reproduction in whole or in part without the express written permission of Daedalus Enterprises Inc is prohibited. Permission to photocopy material in this Journal for noncommercial purposes of scientific or educational advancement is granted. Anyone may, without permission, quote up to 500 words of material in this journal provided the quotation is for noncommercial use and RESPIRATORY CARE is credited. Longer quotation requires written approval by the author and publisher. Single reprints are available only from the authors. Reprints for commercial use may be purchased from Daedalus Enterprises Inc. For information and prices call (972) 243-2272.

DISCLAIMER. The opinions expressed in any article or editorial are those of the author and do not necessarily reflect the views of the Editors, the American Association for Respiratory Care (AARC), or Daedalus Enterprises Inc. Neither are the Editors, the AARC, or the Publisher responsible for the consequences of the clinical applications or use of any methods or devices described in any article or advertisement.

SUBSCRIPTION RATES. Individual subscription rates are $65 per year (12 issues), $125 for 2 years, and $185 for 3 years in the US and Puerto Rico. Rates are $80 per year, $155 for 2 years, and $230 for 3 years in all other countries (add $84 per year for air mail). Single copies when available cost $6; add $7 for air mail postage to overseas countries. Checks should be made payable to RESPIRATORY CARE and sent to the subscription office at 11030 Ables Lane, Dallas TX 75229-4593.

SUBSCRIPTION RATES FOR ASSOCIATIONS. An association may offer individual subscriptions of RESPIRATORY CARE to its members at a reduced rate. The rates based on membership are: $8.50 per year for 101-500 members; $8 for 501-1,500 members; $7.50 for 1,501-10,000 members; $6.50 for more than 10,000 members. For information, contact Ray Masferrer at (972) 243-2272.

CHANGE OF ADDRESS. Notify RESPIRATORY CARE as soon as possible of any change in address. Note the subscription number (from the mailing label) and your name, old address, and new address. Allow 6 weeks for the change. To avoid charges for replacement copies of missed issues, requests must be made within 60 days in the US and 90 days in other countries.

MANUSCRIPTS. The Journal publishes clinical studies, method/device evaluations, reviews, and other materials related to cardiopulmonary medicine and research. Manuscripts may be submitted to the Editorial Office, RESPIRATORY CARE, 11030 Ables Lane, Dallas TX 75229-4593. Instructions for authors are printed in every issue. An expanded version of the Instructions is available from the editorial office.

Copyright © 1997, by Daedalus Enterprises Inc.

RESPIRATORY CARE

June 1997 Reader Service Reply Card **Expires 9/30/97**

Name _____ Phone _____

Institution _____

Street _____

City/State/Zip _____

For faster service, FAX to (609) 786-4415

Send Free Information on the Items Circled Below
(Please Circle No More Than 15 Items)

80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
95	96	97	98	99	100	101	102	103	104	105	106	107	108	109
110	111	112	113	114	115	116	117	118	119	120	121	122	123	124
125	126	127	128	129	130	131	132	133	134	135	136	137	138	139
140	141	142	143	144	145	146	147	148	149	150	151	152	153	154
155	156	157	158	159	160	161	162	163	164	165	166	167	168	169
170	171	172	173	174	175	176	177	178	179	180	181	182	183	184
185	186	187	188	189	190	191	192	193	194	195	196	197	198	199

For AARC Membership Information, Circle 81.
For RESPIRATORY CARE Subscription Information, Circle 82.

I. Type of Institution/Practice
1. ❑ Hospital
2. ❑ Skilled Nursing Facility
3. ❑ Subacute Care Facility
4. ❑ Home Care Practice
5. ❑ School
6. ❑ Distributor

II. Department
A. ❑ Respiratory Care
B. ❑ Cardiopulmonary
C. ❑ Subacute Care
D. ❑ Home Care

III. Specialty
1. ❑ Clinician
2. ❑ Perinatal/Pediatrics
3. ❑ Critical Care
4. ❑ Research
5. ❑ Subacute Care
6. ❑ Diagnostics/ Pulmonary Function
7. ❑ Management
8. ❑ Home Care
9. ❑ Rehabilitation
10. ❑ Education

IV. Position
A. ❑ Department Head
B. ❑ Chief Therapist
C. ❑ Supervisor
D. ❑ Staff Therapist/ Technician
E. ❑ Medical Director
F. ❑ Educator/Instructor
I. ❑ Sales
J. ❑ Other (please specify)

V. Are you a member of the AARC?
1. ❑ Yes 2. ❑ No

Send address changes to RESPIRATORY CARE, 11030 Ables Lane, Dallas TX 75229-4593 • FAX (972) 484-6010

RESPIRATORY CARE

June 1997 Reader Service Reply Card **Expires 9/30/97**

Name _____ Phone _____

Institution _____

Street _____

City/State/Zip _____

For faster service, FAX to (609) 786-4415

Send Free Information on the Items Circled Below
(Please Circle No More Than 15 Items)

80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
95	96	97	98	99	100	101	102	103	104	105	106	107	108	109
110	111	112	113	114	115	116	117	118	119	120	121	122	123	124
125	126	127	128	129	130	131	132	133	134	135	136	137	138	139
140	141	142	143	144	145	146	147	148	149	150	151	152	153	154
155	156	157	158	159	160	161	162	163	164	165	166	167	168	169
170	171	172	173	174	175	176	177	178	179	180	181	182	183	184
185	186	187	188	189	190	191	192	193	194	195	196	197	198	199

For AARC Membership Information, Circle 81.
For RESPIRATORY CARE Subscription Information, Circle 82.

I. Type of Institution/Practice
1. ❑ Hospital
2. ❑ Skilled Nursing Facility
3. ❑ Subacute Care Facility
4. ❑ Home Care Practice
5. ❑ School
6. ❑ Distributor

II. Department
A. ❑ Respiratory Care
B. ❑ Cardiopulmonary
C. ❑ Subacute Care
D. ❑ Home Care

III. Specialty
1. ❑ Clinician
2. ❑ Perinatal/Pediatrics
3. ❑ Critical Care
4. ❑ Research
5. ❑ Subacute Care
6. ❑ Diagnostics/ Pulmonary Function
7. ❑ Management
8. ❑ Home Care
9. ❑ Rehabilitation
10. ❑ Education

IV. Position
A. ❑ Department Head
B. ❑ Chief Therapist
C. ❑ Supervisor
D. ❑ Staff Therapist/ Technician
E. ❑ Medical Director
F. ❑ Educator/Instructor
I. ❑ Sales
J. ❑ Other (please specify)

V. Are you a member of the AARC?
1. ❑ Yes 2. ❑ No

Send address changes to RESPIRATORY CARE, 11030 Ables Lane, Dallas TX 75229-4593 • FAX (972) 484-6010

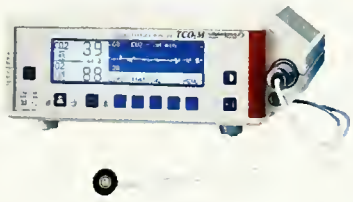
uff!

Monitoring

tors designed
ystem.

hanics Made Easy! The
ows ventilator
e performed
easily. Critical
re and volume
nts are made at
nd can be viewed
r numeric format.

TIDAL WAVE *is "Capnography to Go," offering the powerful performance of a bedside capnograph in a hand-held package. The CO_2 waveform provides the most complete picture of your patient's airway status.*



TCO_2M *is the first transcutaneous monitor with an on-screen trend. Its large graphic display provides easy visibility of patient trend data, local power and alert limits for viewing your patient's progress.*

For more information on these hot new monitors,
call us today at (800) 243-3444 or (203) 265-7701.
Contact our web site at http://www.novametrix.com **Circle 121 on reader service card**

NOVAMETRIX
MEDICAL SYSTEMS INC.
... simply the leading ed

Authors in This Is

Benlifer, Ginger E .....
Cardinal, Pierre.....
De Kler, Randy.....
Djunaedi, Hélène.....
Fluck, Robert R Jr .....
Garrett, Summer.....
Greffe-Laliberté, Ginet
Hess, Dean R .....
Johnson, Larry E .....
Jones, Gwynne.....
Jung, Sarah J.....
Kues, John R .....

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 881 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

AARC Publications
PO BOX 11605
RIVERTON NJ 08076-7205

Advertise in This Is

California College for
Circle Reader Service N
DHD Healthcare.....
Circle Reader Service N
Disease Management (
Circle Reader Service N
Healthdyne Technolog
Circle Reader Service N
HealthScan Products I
Circle Reader Service N

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 881 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

AARC Publications
PO BOX 11605
RIVERTON NJ 08076-7205

COPYRIGHT INFORMAT
Daedalus Enterprises Inc
express written permissi
Permission to photocopy
poses of scientific or edu
without permission, quote
vided the quotation is for
credited. Longer quotatio
publisher. Single reprints
commercial use may be
information and prices call (972) 243-2272.

DISCLAIMER. The opinions expressed in any article or editorial are those of the author and do not necessarily reflect the views of the Editors, the American Association for Respiratory Care (AARC), or Daedalus Enterprises Inc. Neither are the Editors, the AARC, or the Publisher responsible for the consequences of the clinical applications or use of any methods or devices described in any article or advertisement.

SUBSCRIPTION RATES. Individual subscription rates are $65 per year (12 issues), $125 for 2 years, and $185 for 3 years in the US and Puerto Rico. Rates are $80 per year, $155 for 2 years, and $230 for 3 years in all other countries (add $84 per year for air mail). Single copies when available cost $6; add $7 for air mail postage to overseas countries. Checks should be

CHANGE OF ADDRESS. Notify RESPIRATORY CARE as soon as possible of any change in address. Note the subscription number (from the mailing label) and your name, old address, and new address. Allow 6 weeks for the change. To avoid charges for replacement copies of missed issues, requests must be made within 60 days in the US and 90 days in other countries.

MANUSCRIPTS. The Journal publishes clinical studies, method/device evaluations, reviews, and other materials related to cardiopulmonary medicine and research. Manuscripts may be submitted to the Editorial Office, RESPIRATORY CARE, 11030 Ables Lane, Dallas TX 75229-4593. Instructions for authors are printed in every issue. An expanded version of the Instructions is available from the editorial office.

Copyright © 1997, by Daedalus Enterprises Inc.

Hot Stuff!

in Respiratory Monitoring

from Novametrix

Introducing a new line of innovative respiratory monitors designed to meet the needs of a changing healthcare system.

CO_2SMO Plus! *combines capnography, pulse oximetry and respiratory mechanics into one small package. Measurements of CO_2 Production and Deadspace are made directly at the bedside, for optimizing ventilator settings and guiding the weaning process.*

Finally, Mechanics Made Easy! The ***VENT✓*** *allows ventilator checks to be performed quickly and easily. Critical flow, pressure and volume measurements are made at the airway and can be viewed in graphic or numeric format.*

TIDAL WAVE *is "Capnography to Go," offering the powerful performance of a bedside capnograph in a hand-held package. The CO_2 waveform provides the most complete picture of your patient's airway status.*

TCO_2M *is the first transcutaneous monitor with an on-screen trend. Its large graphic display provides easy visibility of patient trend data, local power and alert limits for viewing your patient's progress.*

For more information on these hot new monitors,
call us today at (800) 243-3444 or (203) 265-7701.
Contact our web site at http://www.novametrix.com **Circle 121 on reader service card**

NOVAMETRIX
MEDICAL SYSTEMS INC.
... simply the ***leading ed***

RESPIRADYNE® II PLUS

PULMONARY FUNCTION/VENTILATION MONITOR

Graphic Printouts...Multi-Patient Memory...and Easy to Use

Results-Oriented Features At Cost Effective Prices

■ New Graphic Forced Vital Capacity (FVC) document printout of Flow vs Volume and Volume vs Time ■ New 10 patient memory with 8 pre-bronchodilator and 8 post-bronchodilator tests per patient and automatic calculation of % change ■ New customizing software package ■ New Slow Vital Capacity (SVC) monitoring ■ Automatic determination of "best test" ■ Knudson, ITS and ECCS reference nomograms ■ Easy to operate

Performs A Complete Range Of Test Measurements

Forced Exhalation Parameters

■ Forced Vital Capacity (FVC) ■ Forced Expiratory Volume in One Second (FEV_1) ■ FEV_1/FVC Ratio ■ FVC Time ■ Peak Flow ■ Forced Expiratory Flow Between 25% and 75% of Vital Capacity ($FEF_{25-75\%}$) ■ Percent Extrapolated Volume ($Vol._{EXTRA\%}$)

Weaning/Extubation Parameters

■ Respiratory Rate (RR) ■ Tidal Volume (TV) ■ Minute Volume (MV) ■ Slow Vital Capacity (SVC) ■ Maximum Voluntary Ventilation (MVV) ■ Negative Inspiratory Force (NIF)

For further information, call: **1-800-325-7472 (outside Missouri)** **1-800-392-7318 (in Missouri)**

Sherwood MEDICAL
ST LOUIS MO 63103 U.S.A.

Circle 157 on reader service card